ORDER NO. MTNC010527C1
B5

Service Manual

Color Television

Main Manual

(NA8MS)

Panasonic

Models	Chassis
CT-27SX11E	**AP368**
CT-27SX11UE	**AP368**
CT-27SX11CE	**AP368**
CT-27SX31E	**EP368**
CT-27SX31UE	**EP368**
CT-27SX31CE	**EP368**

This Service manual is issued as a service guide for the models of the **NA8MS** family listed above. Included in this manual are a set of schematic, block diagrams, functional descriptions, alignment procedures, disassembly procedures and a complete parts list.

"**WARNING!** This Service Manual is designed for experienced repair technicians only and is not designed for use by the general public. It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product. **Products powered by electricity should be serviced or repaired only by experienced professional technicians.** Any attempt to service or repair the product or products dealt with in this Service Manual by anyone else could result in serious injury or death."

The service technician is required to read and follow the "**Safety Precautions**" and "**Important Safety Notice**" in this Main Manual.

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Important Safety Notice

Special components are used in this television set which are important for safety. These parts are identified on the schematic diagram by the symbol ⚠ and printed in **BOLD TYPE** on the replacement part list. It is essential that these critical parts are replaced with the manufacturer's specified replacement part to prevent X-ray radiation, shock, fire or other hazards. Do not modify the original design without the manufacturer's permission.

Safety Precautions

General Guidelines

An **Isolation Transformer** should always be used during the servicing of a receiver whose chassis is not isolated from AC power line. Use a transformer of adequate power rating as this protects the technician from accidents resulting in personal injury from electrical shocks. It will also protect the Receiver from being damaged by accidental shorting that may occur during servicing.

When servicing, observe the original lead dress, especially in the high voltage circuit. Replace all damaged parts (also parts that show signs of overheating.)

Always Replace Protective Devices, such as fishpaper, isolation resistors and capacitors, and shields after servicing the Receiver. Use only manufacturer's recommended rating for fuses, circuits breakers, etc.

High potentials are present when this Receiver is operating. Operation of the Receiver without the rear cover introduces danger for electrical shock. Servicing should not be performed by anyone who is not thoroughly familiar with the necessary precautions when servicing high-voltage equipment.

Extreme care should be practiced when **Handling the Picture Tube**. Rough handling may cause it to implode due to atmospheric pressure. (14.7 lbs per sq. in.). Do not nick or scratch the glass or subject it to any undue pressure. When handling, use safety goggles and heavy gloves for protection. **Discharge the picture tube** by shorting the anode to chassis ground (not to the cabinet or to other mounting hardware). When discharging connect cold ground (i.e. dag ground lead) to the anode with a well insulated wire or use a grounding probe.

Avoid prolonged exposure at close range to unshielded areas of the picture tube to prevent exposure to X-ray radiation.

The **Test Picture Tube** used for servicing the chassis at the bench should incorporate safety glass and magnetic shielding. The safety glass provide shielding for the tube viewing area against X-ray radiation as well as implosion. The magnetic shield limits the X-ray radiation around the bell of the picture tube in addition to the restricting magnetic effects. When using a picture tube test jig for service, ensure that the jig is capable of handling **50kV** without causing X-ray radiation.

Before returning a serviced receiver to the owner, the service technician must thoroughly test the unit to ensure that is completely safe to operate. **Do not use a line isolation transformer when testing.**

Leakage Current Cold Check

Unplug the AC cord and connect a jumper between the two plug prongs.

Measure the resistance between the jumpered AC plug and expose metallic parts such as screwheads, antenna terminals, control shafts, etc. If the exposed metallic part has a return path to the chassis, the reading should be between 240kΩ and 5.2MΩ. If the exposed metallic part does not have a return path to the chassis, the reading should be infinite.

Leakage Current Hot Check (Fig. 1)

Plug the AC cord directly into the AC outlet. Do not use an isolation transformer during the check.

Connect a 1.5kΩ 10 watt resistor in parallel with a 0.15μF capacitor between an exposed metallic part and ground. Use earth ground, for example a water pipe.

Using a DVM with a 1000 ohms/volt sensitivity or higher, measure the AC potential across the resistor.

Repeat the procedure and measure the voltage present with all other exposed metallic parts.

Verify that any potential does not exceed 0.75 volt RMS. A leakage current tester (such a Simpson Model 229, Sencore Model PR57 or equivalent) may be used in the above procedure, in which case any current measure must not exceed 0.5 milliamp. If any measurement is out of the specified limits, there is a possibility of a shock hazard and the Receiver must be repaired and rechecked before it is returned to the customer.

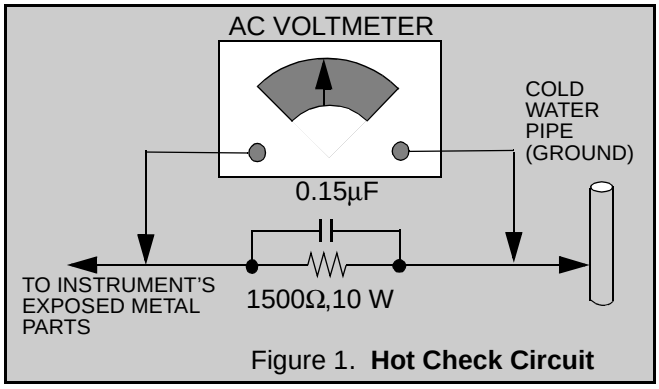


Figure 1. **Hot Check Circuit**

X-ray Radiation

WARNING: The potential source of X-ray radiation in the TV set is in the High Voltage section and the picture tube.

Note: *It is important to use an accurate, calibrated high voltage meter.*

Set the **brightness, picture, sharpness** and **color** controls to Minimum. Measure the High Voltage. The high voltage should be **30.55 ± 1.25kV**. If the upper limit is out of tolerance, immediate service and correction is required to insure safe operation and to prevent the possibility of premature component failure.

Table of Contents

Important Safety Notice 2

Safety Precautions 2
General Guidelines 2
Leakage Current Cold Check 2
X-ray Radiation 2

Service Notes 4

Leadless Chip Component (surface mount) 4
Component Removal 4
Chip Component Installation 4
How to Replace Flat-IC 4

SPECIFICATIONS

Board Designation Table 5

Receiver Feature Table 6

OPERATION

Location of Controls (Receiver) 7

Quick Reference Control Operation 7
Quick Reference 7
Control Operation 7

Location of Controls (Remote)

EUR511500, EUR511502 8

SERVICE

Disassembly for Service 9

Back Cover 9
A-Board - Main Chassis 9
V-Board - CRT Output 9
Speakers 9
Keyboard 9
Disassembly for CRT Replacement 9
CRT Replacement 9
Back Cover Removal 11
Main Components Location 12

Chassis Service Adjustment Procedures . . . 15

140.0V B+ Voltage Confirmation 15
P-Board Voltage Chart 15
A-Board Voltage Chart 15
High Voltage Check 16

Purity and Convergence Procedure 16

When the CRT or the Yoke is Replaced 16
Initial Center Static Convergence 16
Purity Adjustment 16
Dynamic Corvergence Adjustment 17
DY(YHC, YV, XV) Adjustment 17
Permalloy Convergence Corrector Strip (Part No. 0FMK014ZZ) 18

Service Mode (Electronic Controls) 20

Exiting the Service Mode 20
Entering Service Mode (Back-Open Method) 20
Service Mode Regiters 21

Instructional Flow Chart for Service Mode 27

Service Adjustments (Electronic Controls) 30

Sub-Contrast Adjustment 30
Sub-Brightness (B02) 30
Tint/Color Adjustment 30
PIP Sub-Contrast Adjustment (P03) . . . 31
Color Temperature Adjustment 31
Complete Adjustment 31
Horizontal Centering (D00) 32
E-W PCC Adjustment (D0C) 32
Corner PCC Adjustment (D0B) 32
H-Size Adjustment (D0D) 32
V-Size and V-Position Adjustment (D01 & D06) 32
V-Linearity Adjustment (D03) 32
V-Correction Adjustment (D02) 33
MTS Circuit Adjustments 33
Input Level Adjustment (M00) 33
Stereo Separation Adjustment (M01 & M02) 33
Clock Adjustment (S07) 33

Service Adjustments (Mechanical Controls) 34

Focus (part of T551) 34

CIRCUITS & BLOCK DIAGRAMS

Audio Signal Path Block Diagram 35

No-PIP Video Signal Path Block Diagram . . . 36

2-Tuner Video Signal Path Block Diagram . . 37

Parts List 38

FOLDOUTS

Schematics, Voltages and waveforms

C-Board Voltages, PCB & schematics 51
A-Board Schematic *CT-27SX11E/CE/UE* (Left Portion) 52
A-Board Schematic *CT-27SX11E/CE/UE* (Right Portion) 53
A-Board Schematic *CT-27SX31E/CE/UE* (Left Portion) 54
A-Board Schematic *CT-27SX31E/CE/UE* (Right Portion) 55
A-Board PCB 56
A-Board Voltages 57
P-Board schematic 58
P-Board PCB & voltages 59
S-Board Schematic, PCB & voltages 60
Y-Board Schematic, PCB & voltages 61
A-Board Waveforms 62

Service Notes

Note: These components are affixed with glue. Be careful not to break or damage any foil under the component or at the pins of the ICs when removing. Usually applying heat to the component for a short time while twisting with tweezers will break the component loose.

Leadless Chip Component (surface mount)

Chip components must be replaced with identical chips due to critical foil track spacing. There are no holes in the board to mount standard transistors or diodes. Some chips capacitor or resistor board solder pads may have holes through the board, however the hole diameter limits standard resistor replacement to 1/8 watt. Standard capacitor may also be limited for the same reason. It is recommended that identical components be used.

Chip resistor have a three digit numerical resistance code - 1st and 2nd significant digits and a multiplier. Example: 162 = 1600 or 1.6kΩ resistor, 0 = 0Ω (jumper).

Chip capacitors generally do not have the value indicated on the capacitor. The color of the component indicates the general range of the capacitance.

Chip transistors are identified by a two letter code. The first letter indicates the type and the second letter, the grade of transistor.

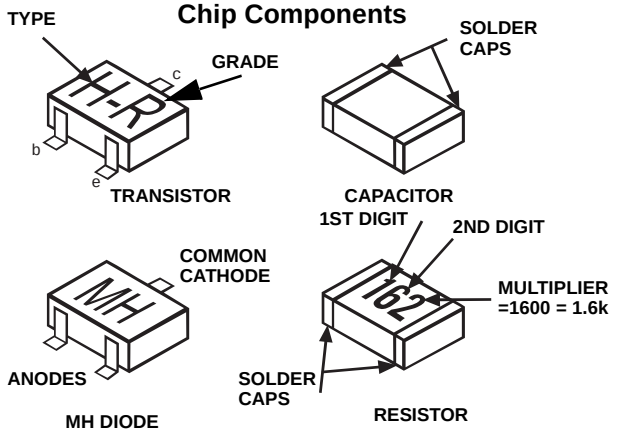
Chip diodes have a two letter identification code as per the code chart and are a dual diode pack with either common anode or common cathode. Check the parts list for correct diode number.

Component Removal

1. Use solder wick to remove solder from component end caps or terminal.
2. Without pulling up, carefully twist the component with tweezers to break the adhesive.
3. Do not reuse removed leadless or chip components since they are subject to stress fracture during removal.

Chip Component Installation

1. Put a small amount of solder on the board soldering pads.
2. Hold the chip component against the soldering pads with tweezers or with a miniature alligator clip and apply heat to the pad area with a 30 watt iron until solder flows. Do not apply heat for more than 3 seconds.

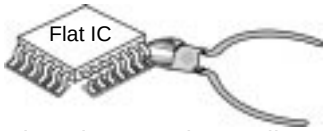


How to Replace Flat-IC

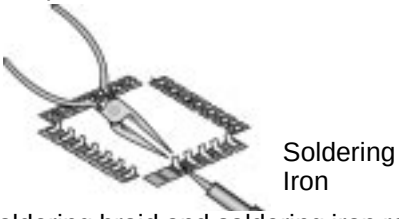
- Required Tools -

- Soldering iron
- De-solder braids
- Needle nose pliers
- Magnifier
- Wire cutters (sharp & small)

1. Cut the pins of a defective IC with wire cutters. Remove IC from board. If IC is glued to the board, heat the IC and release the IC. See Note above.

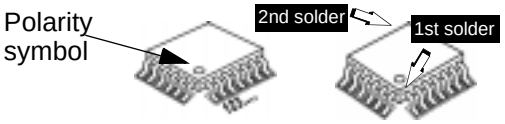


2. Using soldering iron and needle nose pliers remove the IC pins from the board.



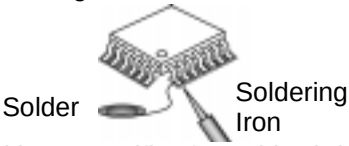
3. Using de-soldering braid and soldering iron remove solder from affected are on board (pads).

4. Position the new Flat-IC in place (apply the pins of the Flat-IC to the soldering pads where the pins need to be soldered). Determine the positions of the soldering pads and pins by correctly aligning the polarity symbol. Solder pin #1 first, align the IC.

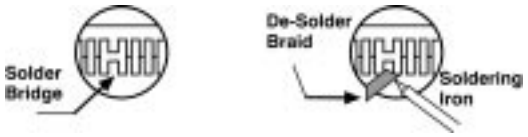


Solder the pin opposite to pin #1. This will assist positioning the IC.

5. Solder all pins to the soldering pads using a fine tipped soldering iron.



6. Check with a magnifier for solder bridge between the pins or for dry joint between pins and soldering pads. To remove a solder bridge, use a de-solder braid as shown in the figure below.



Service Notes (Continued)

IMPORTANT: To protect against possible damage to the solid state devices due to arcing or static discharge, make certain that all ground wires and CTR DAG wire are securely connected.

CAUTION: The power supply circuit is above earth ground and the chassis cannot be polarized. Use an isolation transformer when servicing the Receiver to avoid damage to the test equipment or to the chassis. Connect the test equipment to the proper ground ⏚ () or (⏚) when servicing, or incorrect voltages will be measured.

WARNING: This Receiver has been designed to meet or exceed applicable safety and X-ray radiation protection as specified by government agencies and independent testing laboratories.

To maintain original product safety design standards relative to X-ray radiation and shock and fire hazard, parts indicated with the symbol ⚠ on the schematic must be replaced with identical parts. Order parts from the manufacturer's parts center using the parts numbers shown in this service manual, or provide the chassis number and the part reference number.

For optimum performance and reliability, all other parts should be replaced with components of identical specification.

Board Table Description

BOARD	CT-27SX11E CT-27SX11CE CT-27SX11UE	CT-27SX31E CT-27SX31CE CT-27SX31UE	
A-Board TNP2AH025	NIL	BA	MAIN CHASSIS
C-Board TNP2AA068	AD	AD	CRT BOARD
P-Board TNP2AA078	NIL	NIL	POWER SUPPLY
S-Board TNPA10190	--	AL	SECOND TUNER
Y-Board TNPA1059	--	BC	PIP BOARD

** Note: When ordering a replacement board assembly, append an "S" to the board number.*
Example: To order the A-Board for CT-27SX31E, the replacement board is TNP2AH025BAS.

To order the A-Board for CT-27SX11E, the replacement board is TNP2AH025S.

Receiver Feature Table

FEATURE\MODEL	CT-27SX11E/UE/CE	CT-27SX31E/UE/CE
Chassis	NA8MS	
Tunning system	96K	
# of channels	181	
Menu language	Eng/Span/Fr	
Closed Caption	X	
V-Chip (USA/CANADA)	X	
Picture in Picture	--	2 T
2RF	--	X
75Ω input	X	--
Remote Model #	EUR511502	EUR511500
Picture tube	PF 4:3	
Picture tube Supplier	Samsung	
Comb Filter	3 DIG	
HEC/VEC	VEC	
VM	X	
V/A norm	X	
Color Temp	X	
MTS/SAP/DBX	X	
BASS/BL/TRE Control	X	
AI Sound	X	
Surround	X	
SPATIALIZER/BBE	BBE	
Built-in audio power	7W/CH (10%)	
# of speakers	2 (Open Dome)	
A/V in (rear/front)	3(2/1)	
A/V Program Out	--	X
S-VHS Input (rear/front)	1/1	
Component Input (Y,Pb,Pr)	1	
Audio Out (FAO: F, VAO: V)	F,V	
EPJ/HPJ/MISC	HPJ	
Dimensions mm (WxDxH) in	772x596x733.5 27.1x19.8x23.8	
Weight (kg/lbs)	44.5/98.1	
Power source (V/Hz)	120/60	
Anode voltage	30.55kV ± 1.25kV	
Video input jack	$1V_{p-p}$ 75Ω, phono jack	
Audio input jack	500mV RMS 47kΩ	

Specifications are subject to change without notice or obligation. Dimensions and weights are approximate.

Table 1. **Receiver Features**

Location of Controls (Receiver)

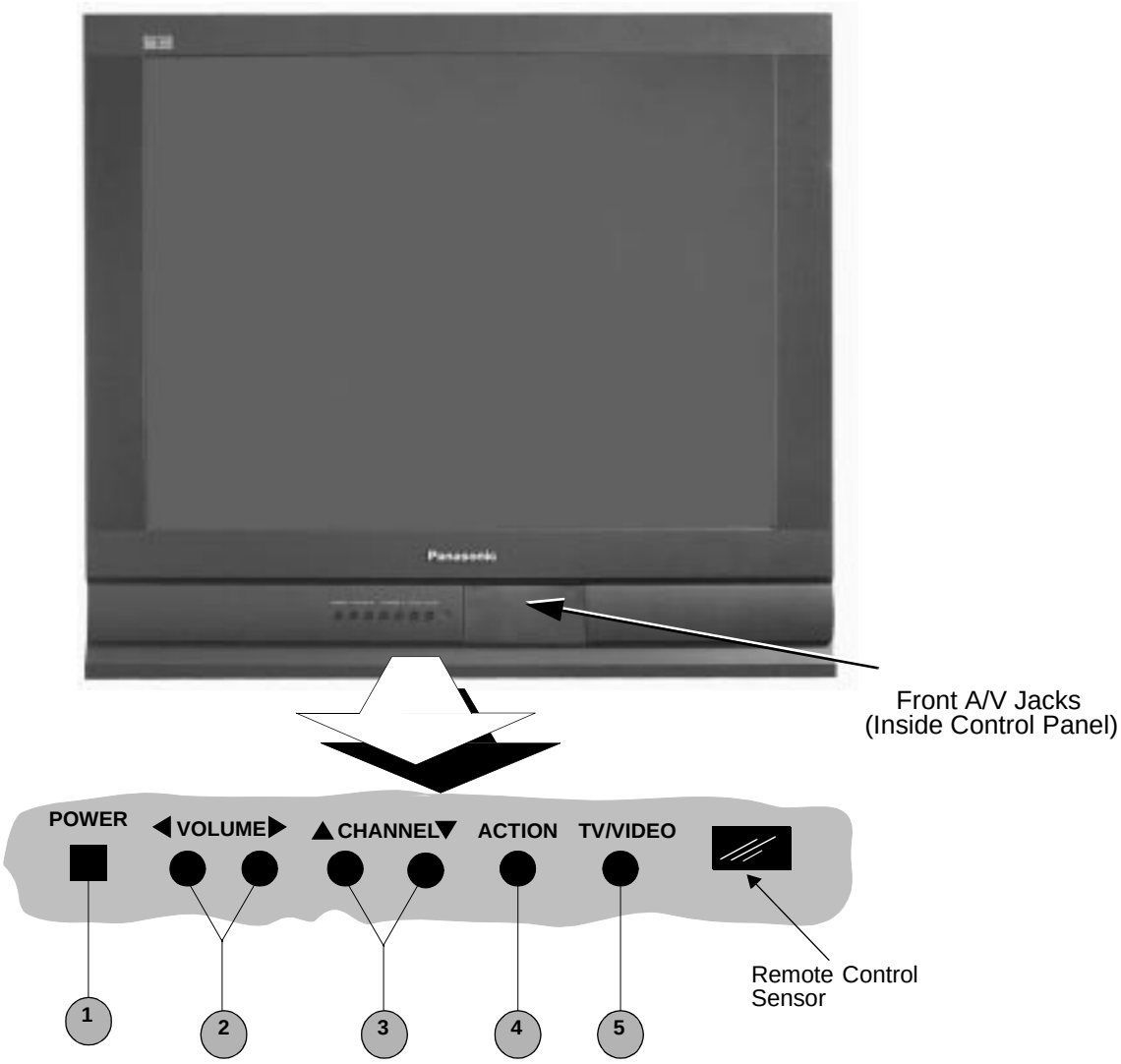


Figure 2. Location of Controls (Receiver).

Quick Reference Control Operation

Quick Reference Control Operation	
1	**Power Button -** Press to turn ON or OFF.
2	**Volume Buttons -** Press to adjust Sound Level, or to adjust Audio Menus, Video Menus, and select operating features when menus are displayed
3	**Channel Buttons -** Press to select programmed channels. Press to highlight desired features when menus are displayed. Also use to select Cable Converter box channels after programming Remote Control Infra-red codes (the TV/AUX/CABLE switch must be set in CABLE position).
4	**Action Button -** Press to display Main Menu and access On Screen feature and Adjustment Menus.
5	**TV/Video Button -** Press to select TV or Video Input.

Location of Controls (Remote)

POWER Button
Press to turn ON and OFF.
MUTE Button
Press to mute sound. A second press resumes sound. Press also to access and delete Closed Caption display.
VCR, DVD, LD/CD, AUX, TV, CBL, DBS, RCVR
Component function buttons
VOL (volume) Buttons
Press to adjust TV sound level. Use with Channel buttons to navigate in menus.
R-TUNE (Rapid Tune) Button.
Press to switch to the previous channel.
ACTION Button
Press to display Main Menu and access or exit On Screen features and Adjustment Menus.
REW, PLAY, FF, TV/VCR, STOP, PAUSE, REC, VCR CHANNEL
Component function buttons.
TV/VIDEO Button
Press to select TV or Video input.
CH (channel) Buttons
Press to select channels. Use with volume buttons to navigate in menus.

EUR511500
CT-27SX31E/CE/UE

EUR511502
CT-27SX11E/CE/UE

Figure 3. **Location of Controls (Remote).**

Disassembly for Service

Back Cover

Remove all the screws marked with an arrow(◄) from the back of the Receiver.

Note: *Screw configuration, type, and number of screws vary depending on the model of the Receiver serviced and the application; various models are covered in this Manual. Use same hardware when reassembling the receiver.*

- 3 screws at the top edge of the Receiver.
- 2 screw by the A/V jacks.
- 1 screw by the antenna jacks.
- 1 screw at each lower corner of the Receiver.
- 1 screw by the retainer plate of the AC power cord.
- 1 scree by the Flyback assy.

A-Board - Main Chassis

The A-Board assembly rest on the cabinet rails as well as the P-Board. Slide chassis out. Disconnect plug connectors; release wire ties and holders as required for complete chassis removal.

The A-Board is connected to the P-Board by two connectors: A1, A2 to P1 and P2 in P-Board. To remove either boards, unplug the connectors on the P-Board.

Note: *Some tie-wraps that secure the wire dressings may need to be unfastened for chassis removal.*

C-Board - CRT Output

Plugs into the socket on the CRT neck.

To release the Focus wire, use a flat tool to release the tab in the socket, pull the wire-look up and remove the wire by pulling away the socket**,** To re-insert, close the wire-look by pushing until is secured with the tab, and insert the wire into the socket

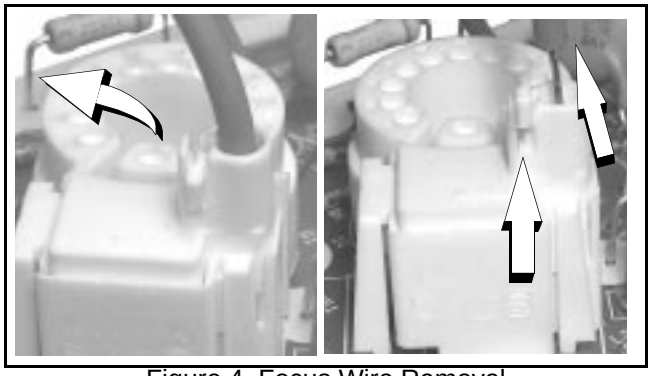


Figure 4. Focus Wire Removal

Speakers

Speakers are assembled to the speaker dome with 4 screws. The speaker/Dome assy is secured to the Speaker Bracket (horn) with 2 screws.

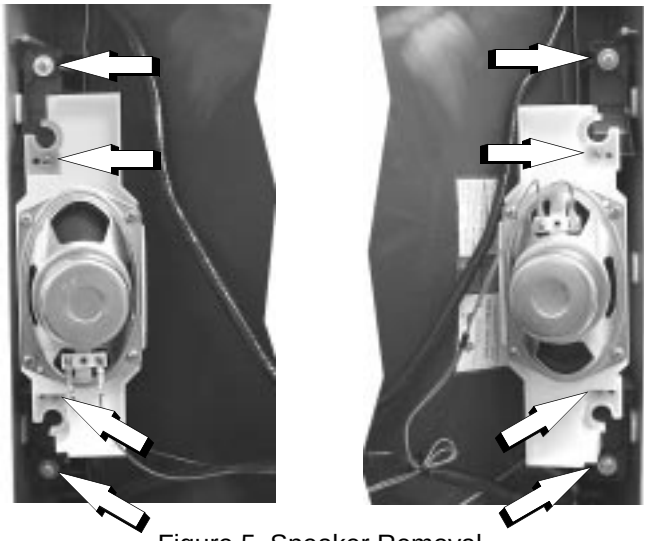


Figure 5. Speaker Removal

Keyboard

Keyboard is pushed to the front by the chassis.

Disassembly for CRT Replacement

1. Discharge the CRT as instructed in the **Safety Precautions** (see page 2).
2. Disconnect the yoke (DY) plug, degaussing coil (DEG) plug and the CRT 2nd anode button from the board.
3. For some models, unplug Geo-magnetic Coil from P-Board, G15.
4. Remove the C-Board from the CRT socket and unplug the black wire (CRT dag ground) C11.
5. Unplug Convergence Yoke CY from C-Board, C2.
6. Lift the Main Chassis (A-Board) and all mounted boards completely out with the CRT Board attached.
7. Disassembly the speakers and speaker brackets from front cabinet.

CRT Replacement

1. Perform **Disassembly for CRT Replacement** procedure.
2. Insure that the CRT H.V. Anode button is discharged before handling the CRT. Read the **Safety Precautions** (see page 2) on handling the picture tube.
3. Remove the components from the CRT neck and place the cabinet face down on a soft pad.
4. Note the original order for the CRT mounting hardware as they are remove from the CRT mounting brackets at each corner of the CRT.
5. Remove the CRT with the degaussing coil and the dag ground braid attached.

Disassembly for Service (Continued)

Note: *To remove the four brackets holding the degauss coil from the corners of the CRT, first remove the CRT from the cabinet, then remove the Brackets by pressing the tab on the bracket and pull upwards.*

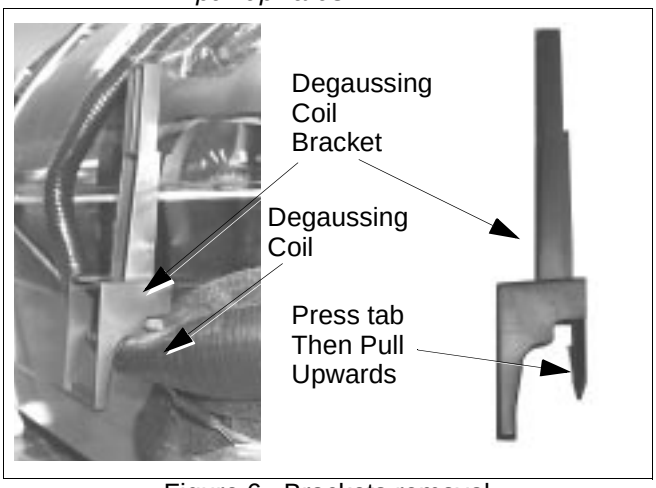


Figure 6. Brackets removal

6. Note the original locations and mounting of the degaussing coil and the dag ground assembly to insure proper reinstallation on the replacement CRT.

   To remove and remount the degaussing coil: The degaussing coil is held in place by clampers fastened to the CRT corner ears. These clampers must be installed onto the replacement CRT prior to mounting the degaussing coil. Confirm Coil is not in contact with speaker bracket.

Figure 7. Coil Installation.

To remove and remount the dag ground braid:

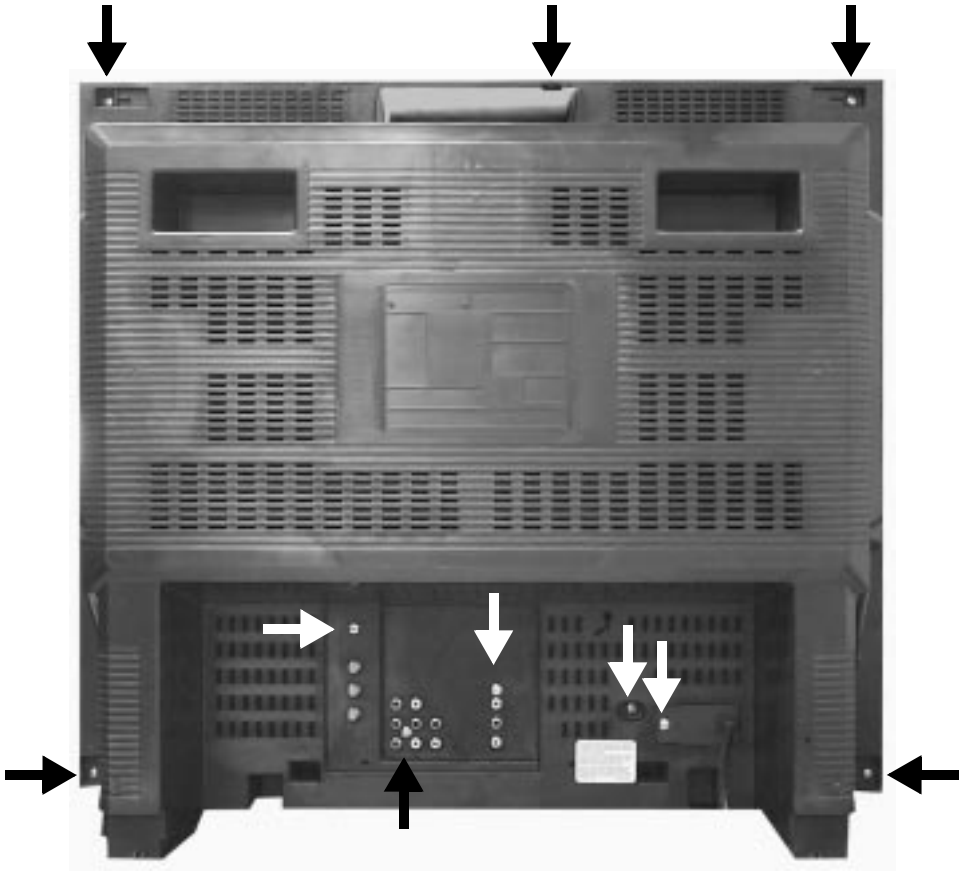
a. Unhook the coil spring from the bottom corners of the CRT ears.

b. Release the braid loop from the upper corners of the CRT ears.

7. Mount the dag ground braid on the replacement CRT. Position the degaussing coil with new ties. Dress coil as was on the original CRT.
8. Replace the components on CRT neck and reinstall into cabinet. Verify that all ground wires and circuit board plugs get connected.

Note: *Reuse all the clampers and mounting brackets from the degaussing coil and screen, and when remounting the degaussing coil assure that is not touching the speakers, this can be done by placing some tape (See Fig. 7), this may cause mask vibration. The mounting brackets and clampers are not supplied with the replacements.*

Back Cover Removal

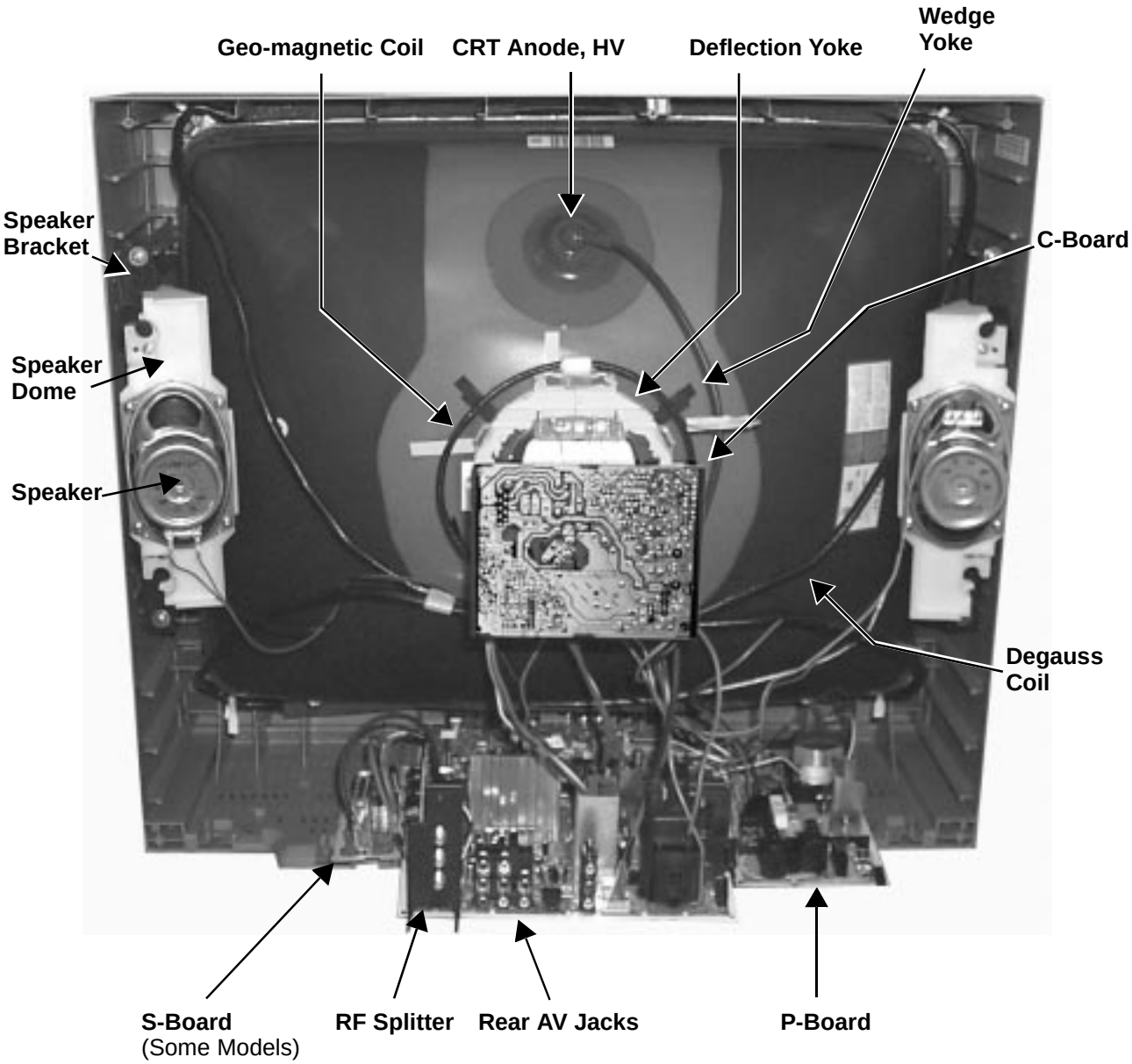


- **3 screws at the top edge of the Receiver.**
- **2 screw by the A/V jacks.**
- **1 screw by the antenna jacks.**
- **1 screw at each lower corner of the Receiver.**
- **1 screw by the retainer plate of the AC power cord.**
- **1 screw by the Flyback assy.**

Figure 8. **Back Cover Removal**

Note: Screw count may vary according to the models.

Rear View



Note: After servicing the receiver, remember to dress the cables, as shown above.

Main Components Location
Main Chassis

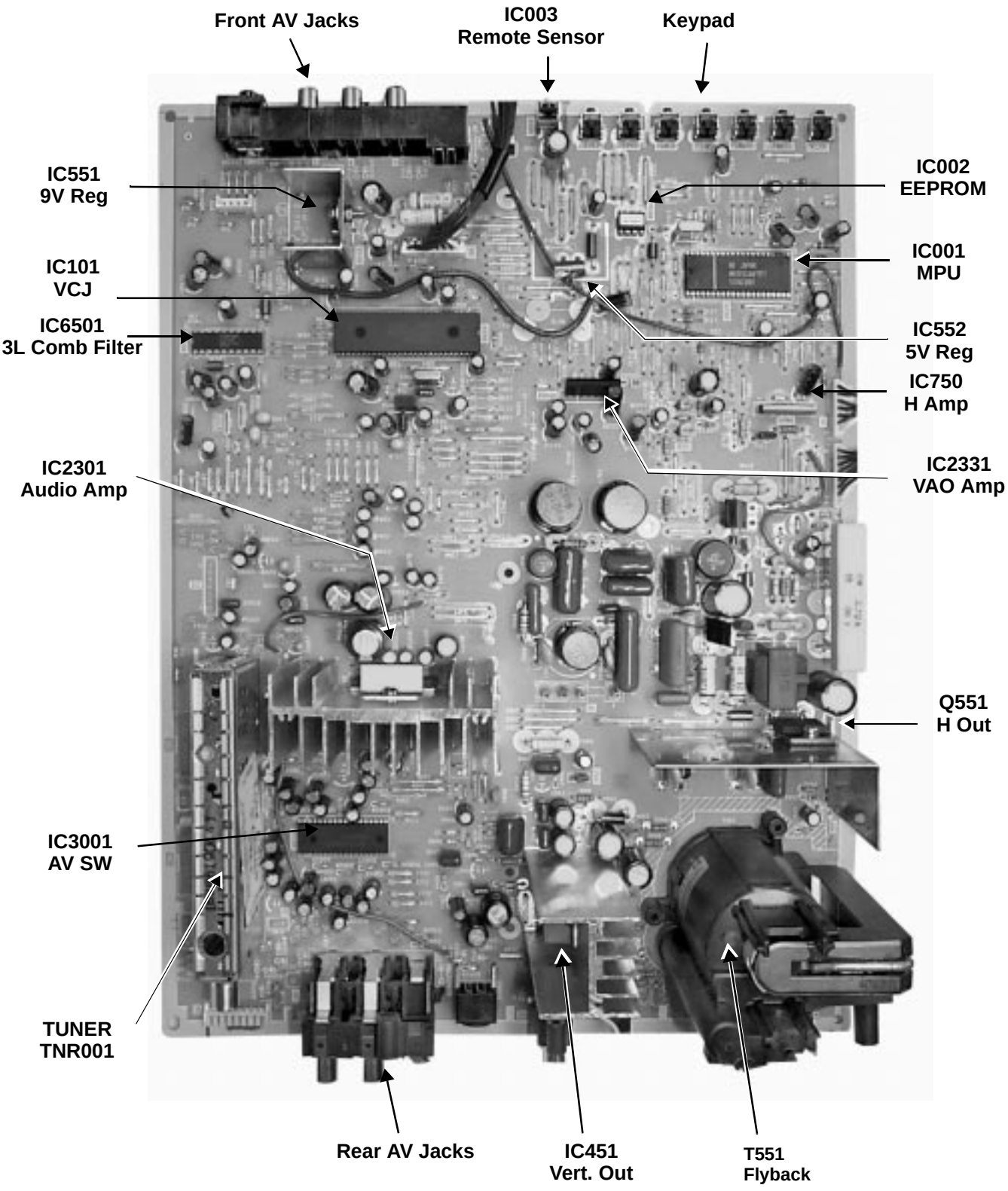
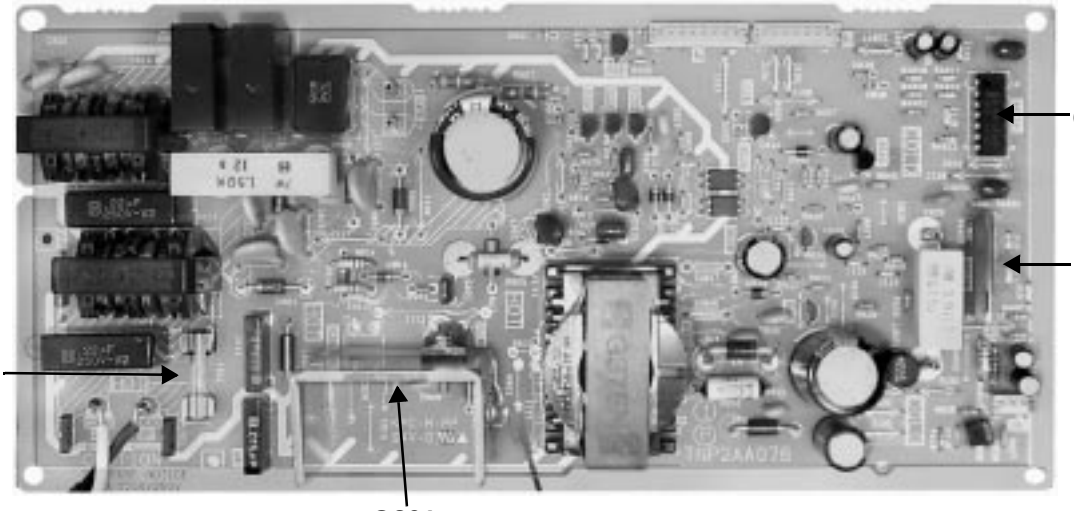
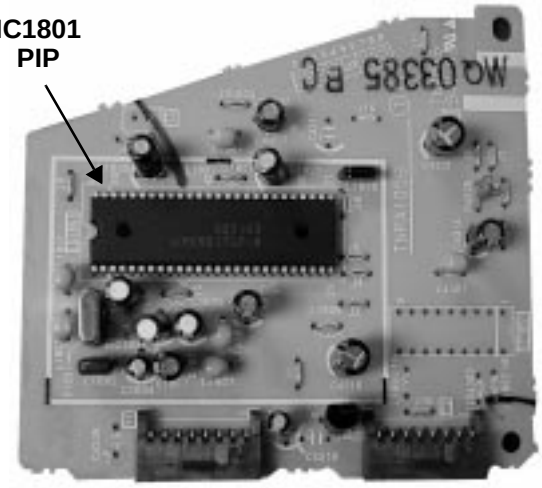
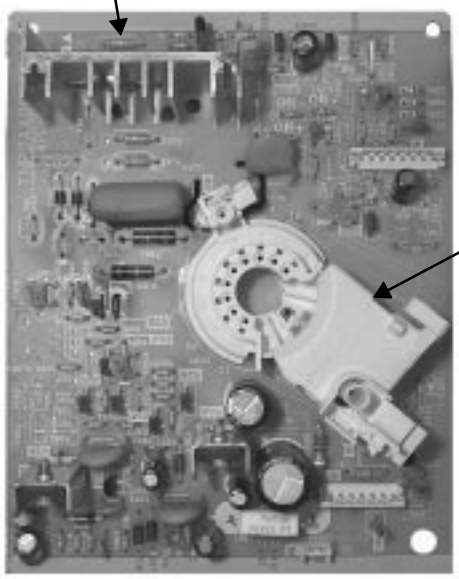


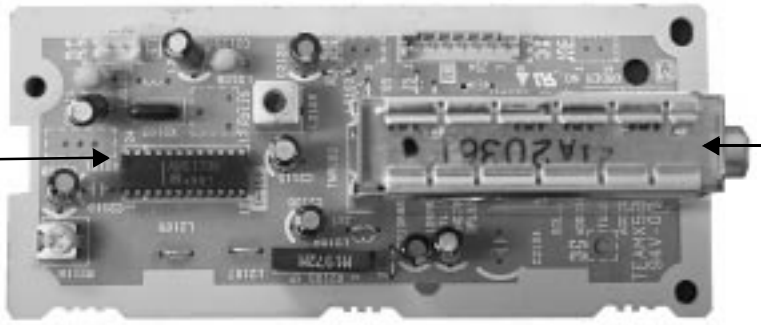
Figure 9. Main Chassis Components

Main Components Location





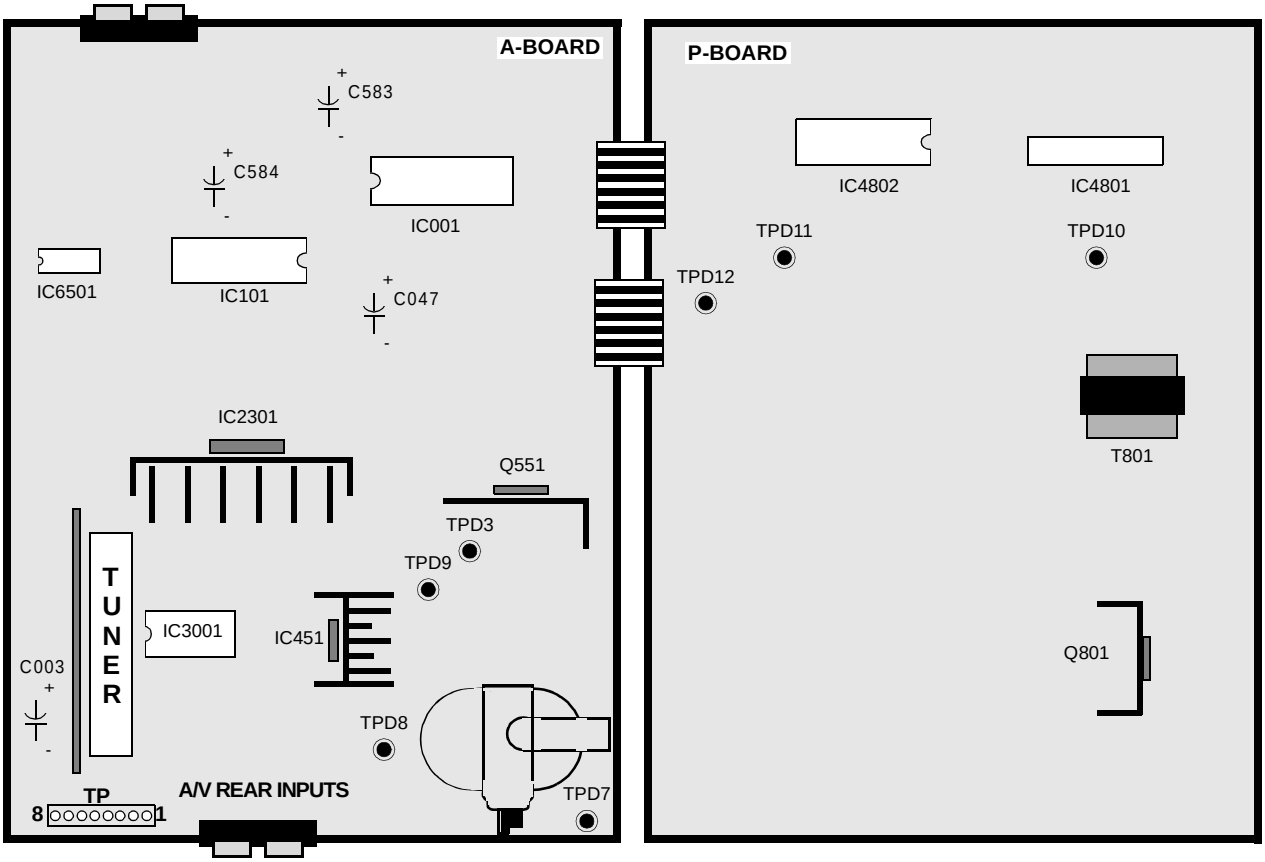




Chassis Service Adjustment Procedures

All service adjustments are factory preset and should not require adjustment unless controls and/or associated components are replaced.

Note: *Connect the (-) lead of the voltmeter to the appropriate ground. Use heat sink when the HOT ground symbol (⏚) is used. Otherwise, use COLD ground (⏚) — Tuner shield.*



140.0V B+ Voltage Confirmation

1. Set the **Bright** and the **Picture** to Minimum by using the Picture Menu.
2. Connect the DVM between **TPP12** (+ side) and cold ground (⏚). (In P-Board).
3. Confirm that B+ voltage is **140.0V ± 1.5V**. This voltage supplies B+ to the Horizontal Output & Flyback circuits.

P-Board B+ Voltages

120V AC line input. Set the **Bright** and the **Picture** to Minimum by using the Picture Menu. Use cold ground (⏚) for the (-) lead of the DVM.

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LOCATION (P-Board)		VOLTAGE Board connected	VOLTAGE Board w/o connect
TPP12	B+	140.0V ± 1.5V	90.0V ± 9V
TPP11	*STBY 12*	13.0V ± 2V	8.2V ± 1V
TPP10	*SOUND*	33.0V ± 5V	25.0V ± 3V
For Sound GND use connector P1-pin 5			

A-Board B+ Voltages

120V AC line input. Set the **Bright** and the **Picture** to Minimum by using the Picture Menu. Use cold ground (⏚) for the (-) lead of the DVM.

LOCATION (A-Board)		VOLTAGE
C584 (+)	*MAIN 9*	9.0V ± 0.5V
C583 (+)	*MAIN 5*	5.0V ± 0.3V
TPD9	*MAIN -15*	-15V ± 2V
TPD3	*MAIN 15*	15V ± 2V
TPD8	*MAIN 7.5*	7.1V ± 1.0V
C047 (+)	*MAIN -15*	-15V ± 2V
C003 (+)	*BTL 32*	32.5V ± 2.0V
TPD7	*MAIN 220*	220V ± 9.0V

Adjust Picture Menu for normalized video adjustments.

High Voltage Check

1. Select an active TV channel and confirm that horizontal is in sync.
2. Adjust Brightness and Picture using Picture Icon menu so video just disappears.
3. Confirm B+ 140.0V is within limit.
4. Using a high voltage meter confirm that the High Voltage is **30.55kV ± 1.25kV**.

Purity and Convergence Procedure

Adjustment is necessary only if the CRT or the deflection yoke is replaced or if the setting was disturbed. The complete procedure consists of:

1. Vertical Raster Shift Adjustment.
2. Initial static convergence.
3. Setting the purity.
4. Final static convergence.

When the CRT or the Yoke is Replaced

Place the yoke on the CRT neck (do not tighten the clamp).

Place the vertical raster shift tabs at 3 o'clock (90º from the purity and convergence tabs)

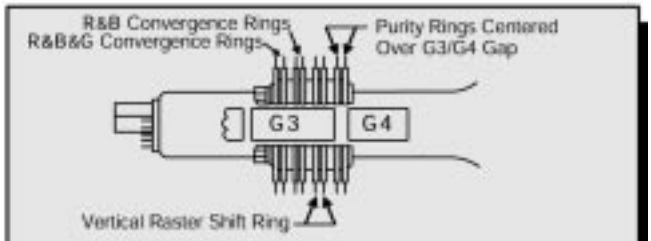


Figure 10. **Positioning of Purity/Convergence Assembly (4 Pairs of Rings)**

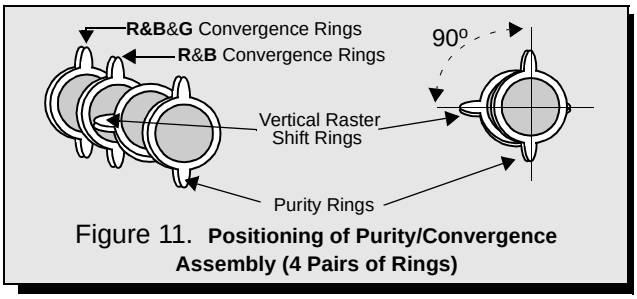


Figure 11. **Positioning of Purity/Convergence Assembly (4 Pairs of Rings)**

Turn the Receiver ON. Operate the Receiver for 60 minutes using the first Purity Check field (white screen) to stabilize the CRT.

Fully degauss the Receiver by using an external degaussing coil.

Slide the deflection yoke back and forth on the neck of the CRT until it produces a near white, uniform raster.

Vertical Raster Shift Adjustment.

Apply a green pattern with a horizontal line, adjust the Deflection Yoke so that has no tilt, then secure it.

Adjust center line of the pattern with the mechanical center of the CRT, this center is determined by two marks at the side edges of the screen. To adjust the line, once the vertical raster shift tabs are place at 3 o'clock to reduce its magnetic field effect (see Fig. 10 and Fig. 11) open the tabs the same angle from the center, until the center line of the pattern becomes a straight line, centered with the marks of the CRT. (see Fig. 12)

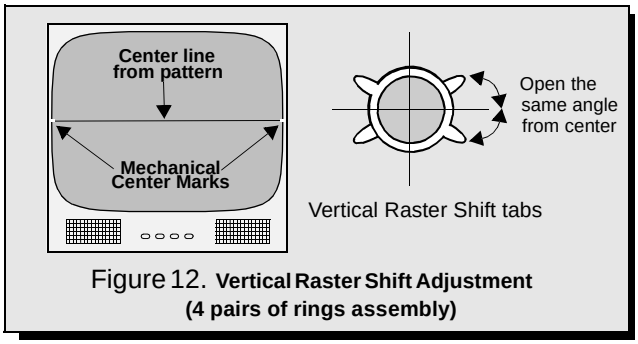


Figure 12. **Vertical Raster Shift Adjustment (4 pairs of rings assembly)**

Initial Center Static Convergence

Connect a dot/cross hatch generator to the Receiver and tune in a signal. Observe misconvergence at center of the screen only.

Adjust the R&B pole magnets; by separating tabs and rotating to converge blue with red.

Adjust the R&B and R&B&G pole magnets: by separating tabs and rotating to converge blue and red (magenta) with green.

Note: *Precise convergence at this point is not important.*

Purity Adjustment

When the Receiver is in the Service Mode, press the **Recall** button on the Remote Control to enter Purity Check. (See the **Service Adjustments Electronic Controls** procedure).

Operate the Receiver for 60 minutes using the first Purity Check field (white screen) to stabilize the CRT.

Fully degauss the Receiver by using an external degaussing coil.

Press the **Recall** button on the Remote Control again until the Purity Check (green screen) appears.

Loosen the deflection yoke clamp screw and move the deflection yoke back as close to the purity magnet as possible.

Adjust the Purity rings to set the vertical green raster precisely at the center of the screen (see Fig. 13).

NOTES:
1. CRT warm up with white screen (three guns activated) is needed to stabilize the shadow mask expansion.
2. Initial center static convergence (roughly centers three gun beams) is required in order to perform purity adjustment.

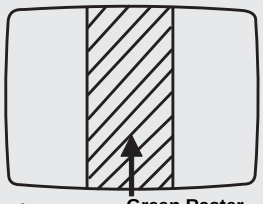


Figure 13. **Green Raster**

Slowly move the deflection yoke forward until the best overall green screen is displayed.
Tighten the deflection yoke clamp screw.
Press the **Recall** button on the Remote Control again until the purity check blue and red screens appear and observe that good purity is obtained on each respective field.
Press the **Recall** button on the Remote Control again until Purity check (white screen) appears. Observe the screen for uniform white. If purity has not been achieved, repeat the above procedure.

Final Convergence Procedure (see Fig. 17 through Fig. 19):

Note: *Vertical size and focus adjustments must be completed prior to performing the convergence adjustment. Connect a dot pattern generator to the Receiver. The* ***Brightness*** *level should not be higher than necessary to obtain a clearpattern.*

Converge the red and the blue dots at the center of the screen by rotating the R&B pole Static Convergence Magnets.
Align The converged red/blue dots with the green dots at the center of the screen by rotating the R&B&G pole Static Convergence Magnets. Melt wax with soldering iron to reseal the magnets.
Slightly tilt vertically and horizontally (do not rotate) the deflection yoke to obtain a good overall convergence.
If convergence is not reached at the edges, insert permalloy (see following section) from the DY corners to achieve proper convergence. Recheck for purity and readjust if necessary.
After vertical adjustment of the yoke, insert wedge at 11 o'clock position, then make the horizontal tilt adjustment.
Secure the deflection yoke by inserting two side wedges at 3 and 7 o'clock positions.
Apply adhesive between tab (thin portion) of wedge and CRT and place tape over the tab to secure to the CRT.

Dynamic Convergence Adjustment

Use this for a precisely overall convergence adjust at the edges.

DY(Y_{HC}, Y_V, X_V) Adjustment

Y_V Adjustment (VR1 for Horizontal dynamic convergence)

1. Apply a crosshatch pattern.
2. Adjust contrast and brightness customer controls to obtain a correct picture.
3. With a driver adjust VR1 (located in deflection yoke board Fig. 19) to obtain a proper convergence at top and bottom of the screen (See Fig. 14)

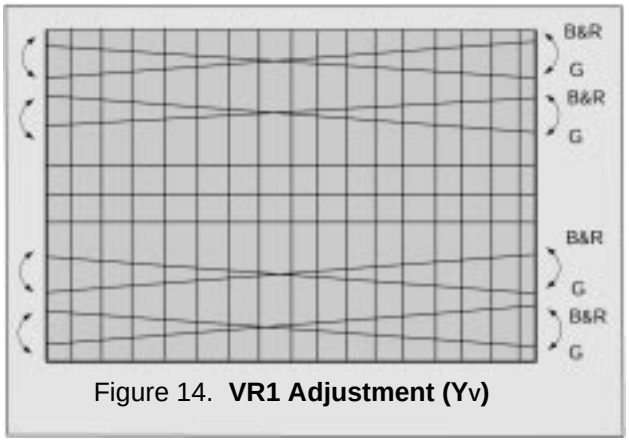


Figure 14. **VR1 Adjustment (Y_V)**

Y_H Adjustment (VR2 for Vertical dynamic convergence)

1. Apply a crosshatch pattern.
2. Adjust contrast and brightness customer controls to obtain a correct picture.
3. With a driver Adjust VR2 (located in deflection yoke board Fig. 19) to obtain a proper convergence at left and right side of the screen. (See Fig. 15)

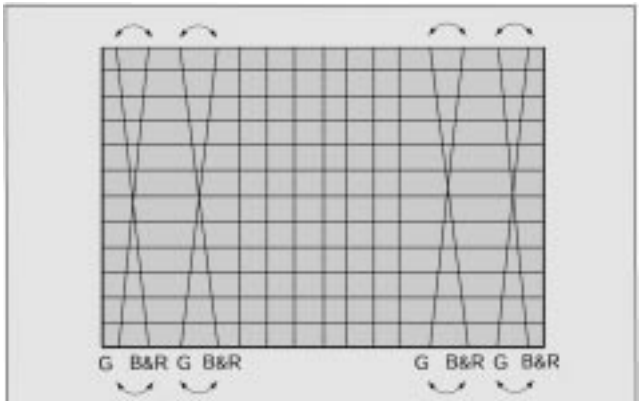


Figure 15. **VR2 Adjustment (Y_H)**

Xv Adjustment (precise adjustment)

1. Apply a crosshatch pattern.
2. Adjust contrast and brightness customer controls to obtain a correct picture.
3. With a driver adjust the coil located in deflection yoke board to obtain a proper convergence horizontally.

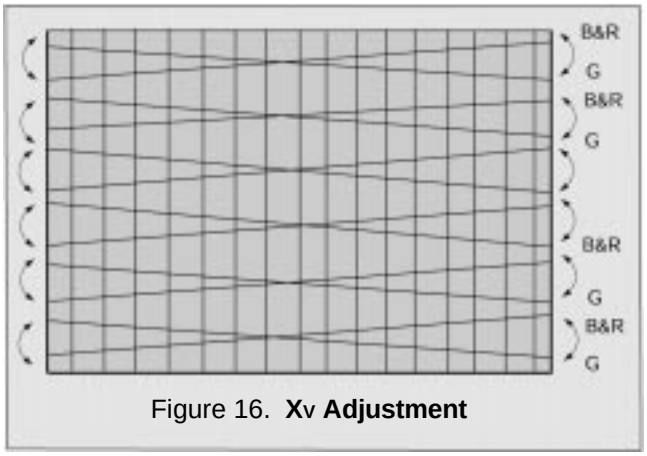


Figure 16. **Xv Adjustment**

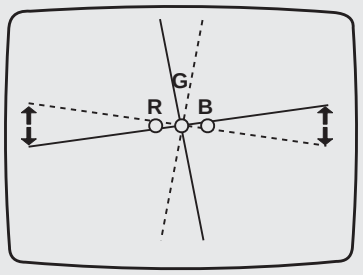
Note: *Apply a red pattern and confirm purity, if purity is poor, repeat purity adjustments.*

Permalloy Convergence Corrector Strip (Part No. 0FMK014ZZ)

This strip is used in some sets to match the yoke and CRT for optimum convergence. If the yoke or CRT is replaced, the strip may not be required.
First converge the set without the strip and observe the corners.

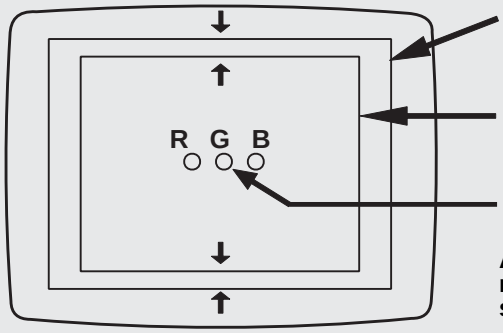
If correction is needed:

1. Place strip between CRT and yoke, in quadrant needing correction. Slowly move it around for desired results.
2. Press adhesive tightly to the CRT and secure with tape.



As the yoke is tilted vertically, the rasters produced by the outside guns rotate in opposite directions.

Figure 17. **Vertical Yoke Movement**



Raster produced from one of the outside electron beams

Raster from the other side electron beam

Static convergence magnets are set for center convergence

As the yoke is tilted horizontally, one raster gets larger while the other gets smaller

Figure 18. **Horizontal Yoke Movement**

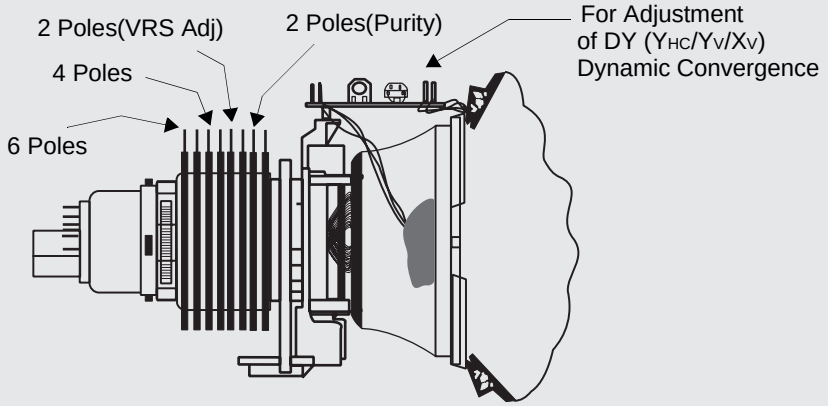


Figure 19. **Convergence Magnets and Wedges Location**

IMPORTANT NOTE:
Always Exit the Service Mode Following Adjustments.

Service Mode (Electronic Controls)

This Receiver has electronic technology using the I²C Bus Concept. It performs as a control function and it replaces many mechanical controls. Instead of adjusting mechanical controls individually, many of the control functions are now performed by using “On Screen Display Menu”. (The **Service Adjustment Mode**.)

Note: *It is suggested that the technician reads all the way through and understand the following procedure for Entering/Exiting the **Service Adjustment Mode**; then proceed with the instructions working with the Receiver. When becoming familiar with the procedure, the Flow Chart for Service Mode may be used as a quick guide.*

Quick Entry to Service Mode:

At times when minor adjustments need to be done to the electronic controls, the method of Entering the service Mode without removal of the cabinet back is as follows using the Remote Control:

1. Select SET-UP icon and select CABLE mode.
2. Select TIMER icon and set SLEEP time for 30 Min.
3. Press ACTION button 3 times to exit menus.
4. Tune to the Channel 124.
5. Adjust VOLUME to minimum (0).
6. Press the VOL ◀ button (decrease) **on Receiver**. Red “CHK” appears in upper corner.

To toggle between Aging and Service modes:

While the “CHK” is displayed on the left top corner of the CRT, pressing the Action and the Volume Up buttons on the Receiver simultaneously will toggle between the modes. Red “CHK” for Service and yellow “CHK” for Aging.

7. **Press** the **Power** Button on the **Remote Control** to select one of the Service Adjustment Modes.
   1) **B** Service VCJ SUB-DATA ADJUSTMENT.
   2) **C** Service VCJ CUT-OFF ADJUSTMENT.
   3) **D** Service GEOMETRY ADJUSTMENT.
   4) **M** Service MTS ADJUSTMENTS.
   5) **P** Service PIP ADJUSTMENT.
   6) **S** Service S OPTION ADJUSTMENTS.
   7) **X** Service COMB FILTER ADJUSTMENT.
   8) **E** Service AUDIO ADJUSTMENTS
   9) “**CHK**” = Normal operation of CHANNEL ▲▼ and VOLUME ◀ ▶.

Note: *Only the applicable settings for the Receiver serviced will be available (See* **a** *in Fig. 20).*

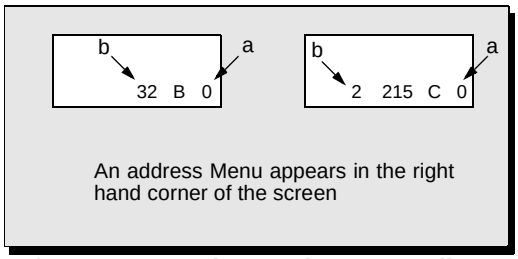


Figure 20. **Service Mode Menu Adjustments.**

Exiting the Service Mode:

Press the **Action** and the **Power** buttons on the **Receiver** simultaneously for at least 2 seconds.

THE RECEIVER EXITS SERVICE MODE.

The Receiver momentarily shuts off; then comes back on tuned to channel 3 with a preset level of sound. Any programmed channels, channels caption data and some others user defined settings will be erased.

IMPORTANT NOTE:
Always Exit the Service Mode Following Adjustments.

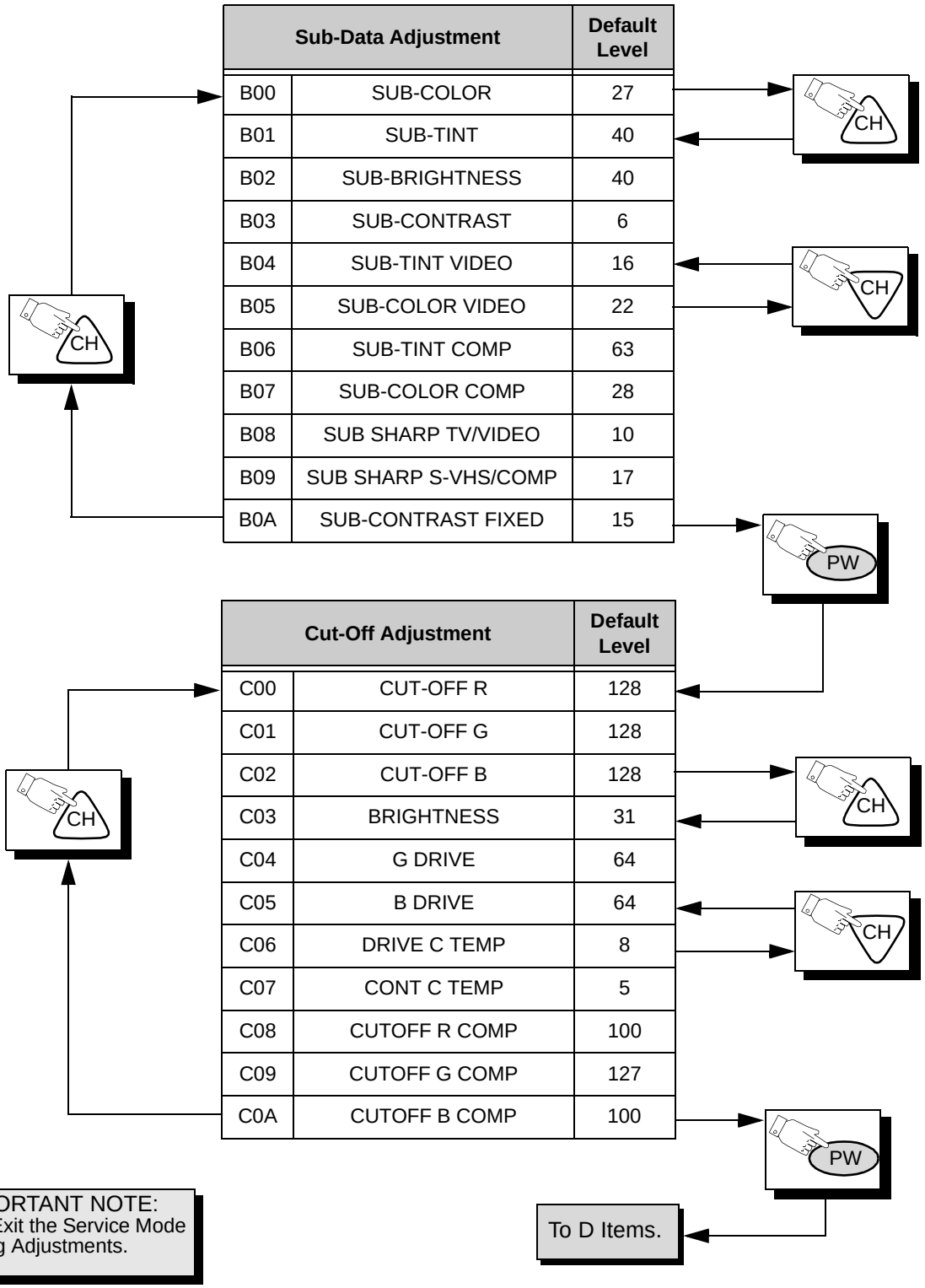
Press the **Power Button** on the **Remote Control** to select the Service Adjustment.

For Adjustments:

1. **Press Channel Up/Down** on the **Remote Control** to select one of the available Service Adjustments (**a** in Fig. 20).

Note: *Write Down the original value set (**b** in* Fig. 20*) for each address before modifying anything. It is easy to erroneously adjust the wrong item.*

2. **Press Volume Up/Down** on the **Remote Control** to adjust the level of the selected Service Adjustment (**b** in Fig. 20).



Sub-Data Adjustment		Default Level
B00	SUB-COLOR	27
B01	SUB-TINT	40
B02	SUB-BRIGHTNESS	40
B03	SUB-CONTRAST	6
B04	SUB-TINT VIDEO	16
B05	SUB-COLOR VIDEO	22
B06	SUB-TINT COMP	63
B07	SUB-COLOR COMP	28
B08	SUB SHARP TV/VIDEO	10
B09	SUB SHARP S-VHS/COMP	17
B0A	SUB-CONTRAST FIXED	15

Cut-Off Adjustment		Default Level
C00	CUT-OFF R	128
C01	CUT-OFF G	128
C02	CUT-OFF B	128
C03	BRIGHTNESS	31
C04	G DRIVE	64
C05	B DRIVE	64
C06	DRIVE C TEMP	8
C07	CONT C TEMP	5
C08	CUTOFF R COMP	100
C09	CUTOFF G COMP	127
C0A	CUTOFF B COMP	100

IMPORTANT NOTE:
Always Exit the Service Mode Following Adjustments.

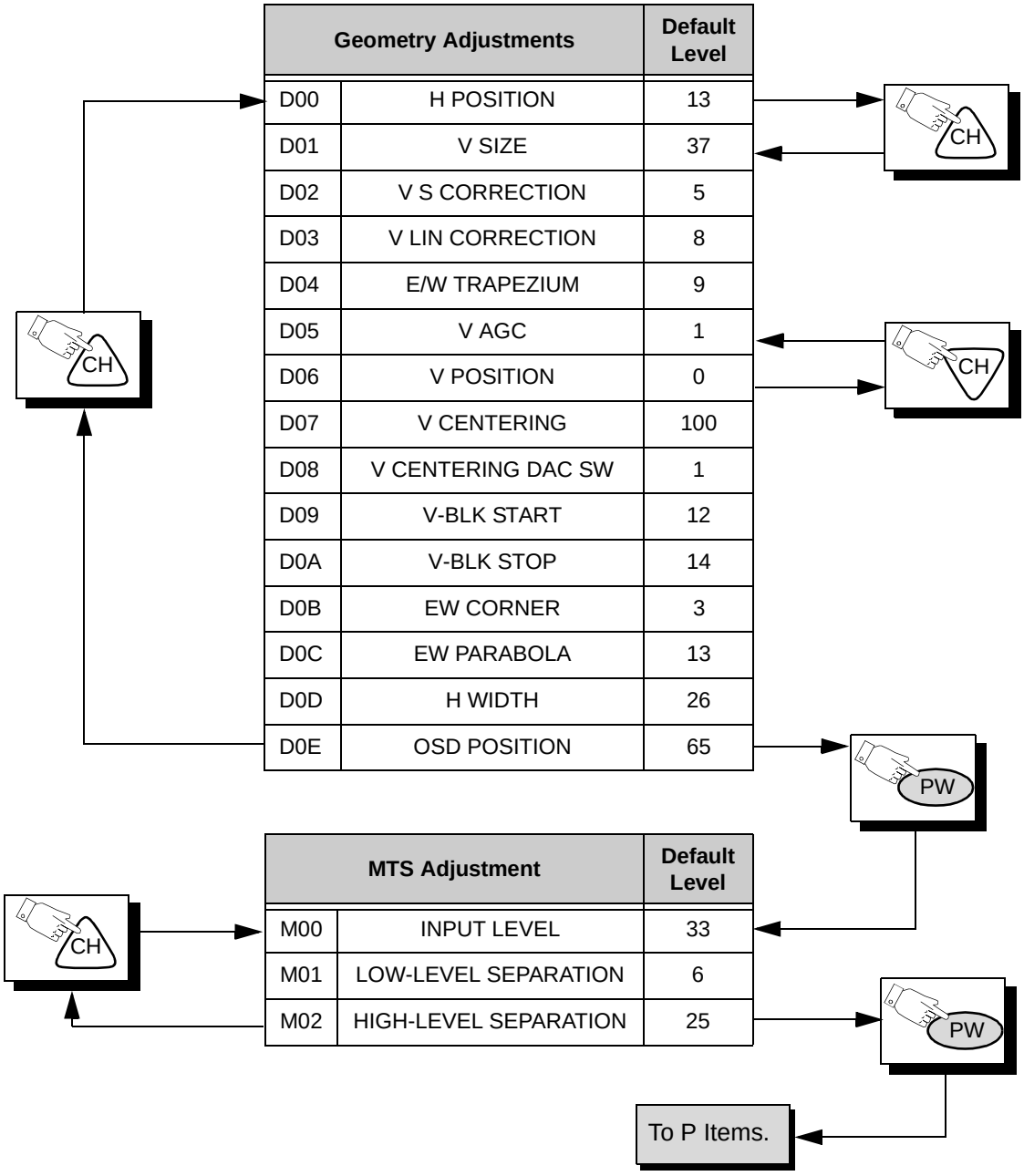
Press the Power Button on the Remote Control to select the Service Adjustment

For Adjustments:

1. **Press Channel Up/Down** on the **Remote Control** to select one of the available Service Adjustments (**a** in Fig. 20).

Note: *Write Down the original value set (**b** in* Fig. 20*) for each address before modifying anything. It is easy to erroneously adjust the wrong item.*

2. **Press Volume Up/Down** on the **Remote Control** to adjust the level of the selected Service Adjustment (**b** in Fig. 20).



Geometry Adjustments		Default Level
D00	H POSITION	13
D01	V SIZE	37
D02	V S CORRECTION	5
D03	V LIN CORRECTION	8
D04	E/W TRAPEZIUM	9
D05	V AGC	1
D06	V POSITION	0
D07	V CENTERING	100
D08	V CENTERING DAC SW	1
D09	V-BLK START	12
D0A	V-BLK STOP	14
D0B	EW CORNER	3
D0C	EW PARABOLA	13
D0D	H WIDTH	26
D0E	OSD POSITION	65

MTS Adjustment		Default Level
M00	INPUT LEVEL	33
M01	LOW-LEVEL SEPARATION	6
M02	HIGH-LEVEL SEPARATION	25

Note: *Some adjustment modes may not be available in some formats.*

IMPORTANT NOTE:
Always Exit the Service Mode Following Adjustments.

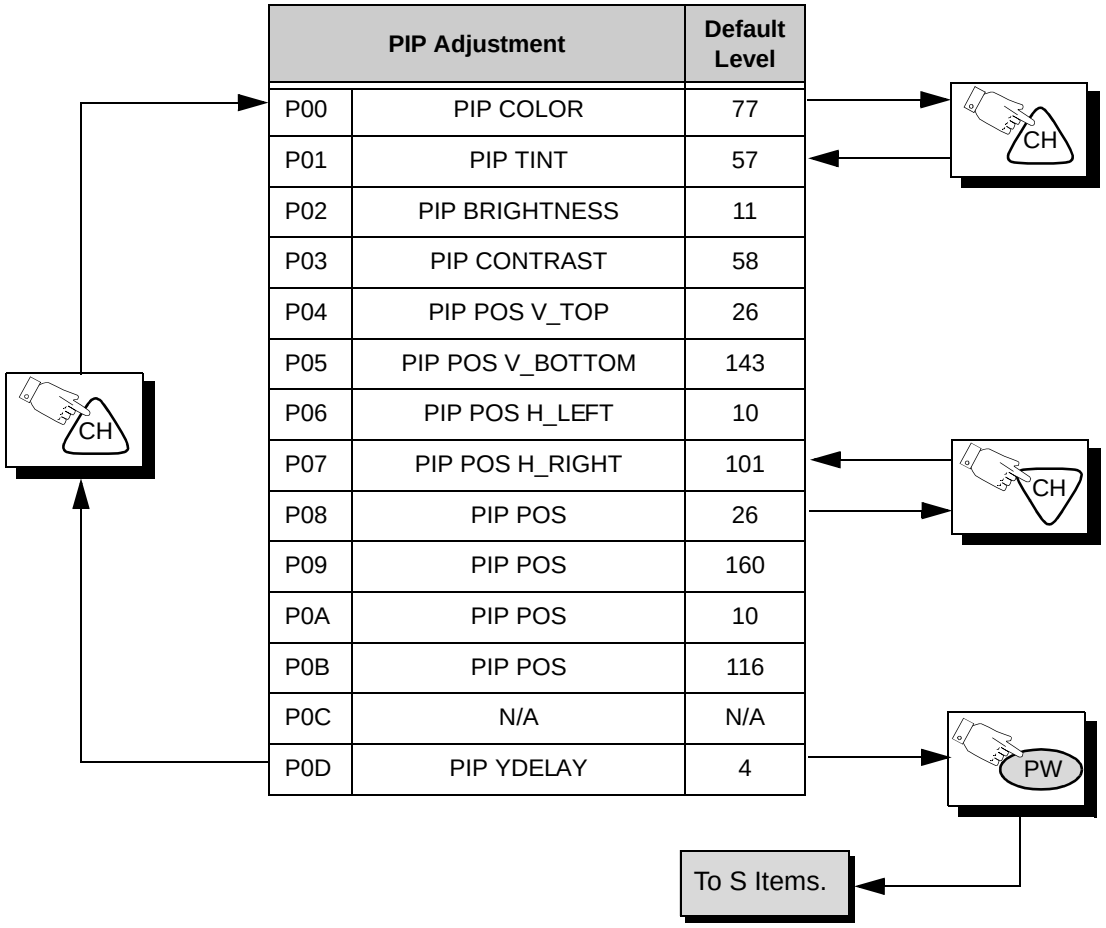
Press the Power Button on the Remote Control to select the Service Adjustment

For Adjustments:

1.**Press Channel Up/Down** on the **Remote Control** to select one of the available Service Adjustments (**a** in Fig. 20).

Note: *Write Down the original value set (**b** in* Fig. 20*) for each address before modifying anything. It is easy to erroneously adjust the wrong item.*

2.**Press Volume Up/Down** on the **Remote Control** to adjust the level of the selected Service Adjustment (**b** in Fig. 20).



PIP Adjustment		Default Level
P00	PIP COLOR	77
P01	PIP TINT	57
P02	PIP BRIGHTNESS	11
P03	PIP CONTRAST	58
P04	PIP POS V_TOP	26
P05	PIP POS V_BOTTOM	143
P06	PIP POS H_LEFT	10
P07	PIP POS H_RIGHT	101
P08	PIP POS	26
P09	PIP POS	160
P0A	PIP POS	10
P0B	PIP POS	116
P0C	N/A	N/A
P0D	PIP YDELAY	4

Note: *Some adjustment modes may not be available in some formats.*

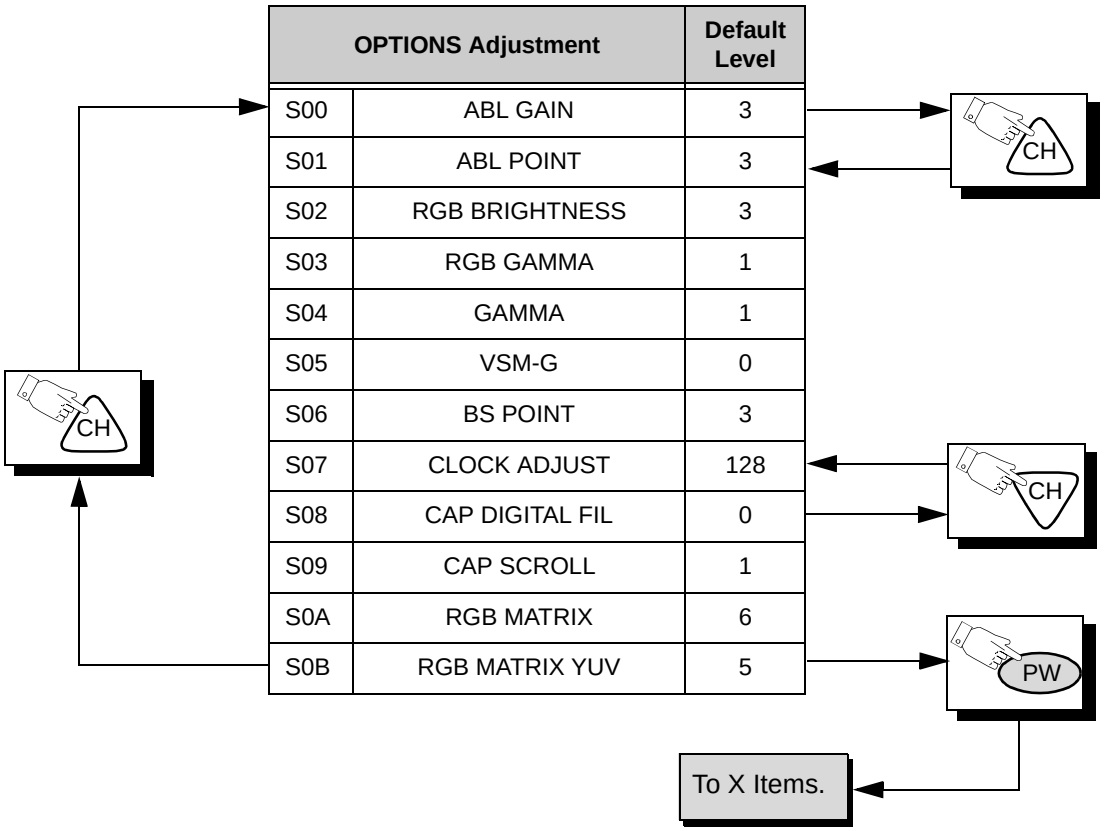
Press the Power Button on the Remote Control to select the Service Adjustment

For Adjustments:

1. **Press Channel Up/Down** on the **Remote Control** to select one of the available Service Adjustments (**a** in Fig. 20).

Note: *Write Down the original value set (**b** in* Fig. 20*) for each address before modifying anything. It is easy to erroneously adjust the wrong item.*

2. **Press Volume Up/Down** on the **Remote Control** to adjust the level of the selected Service Adjustment (**b** in Fig. 20).



OPTIONS Adjustment		Default Level
S00	ABL GAIN	3
S01	ABL POINT	3
S02	RGB BRIGHTNESS	3
S03	RGB GAMMA	1
S04	GAMMA	1
S05	VSM-G	0
S06	BS POINT	3
S07	CLOCK ADJUST	128
S08	CAP DIGITAL FIL	0
S09	CAP SCROLL	1
S0A	RGB MATRIX	6
S0B	RGB MATRIX YUV	5

IMPORTANT NOTE:
Always Exit the Service Mode Following Adjustments.

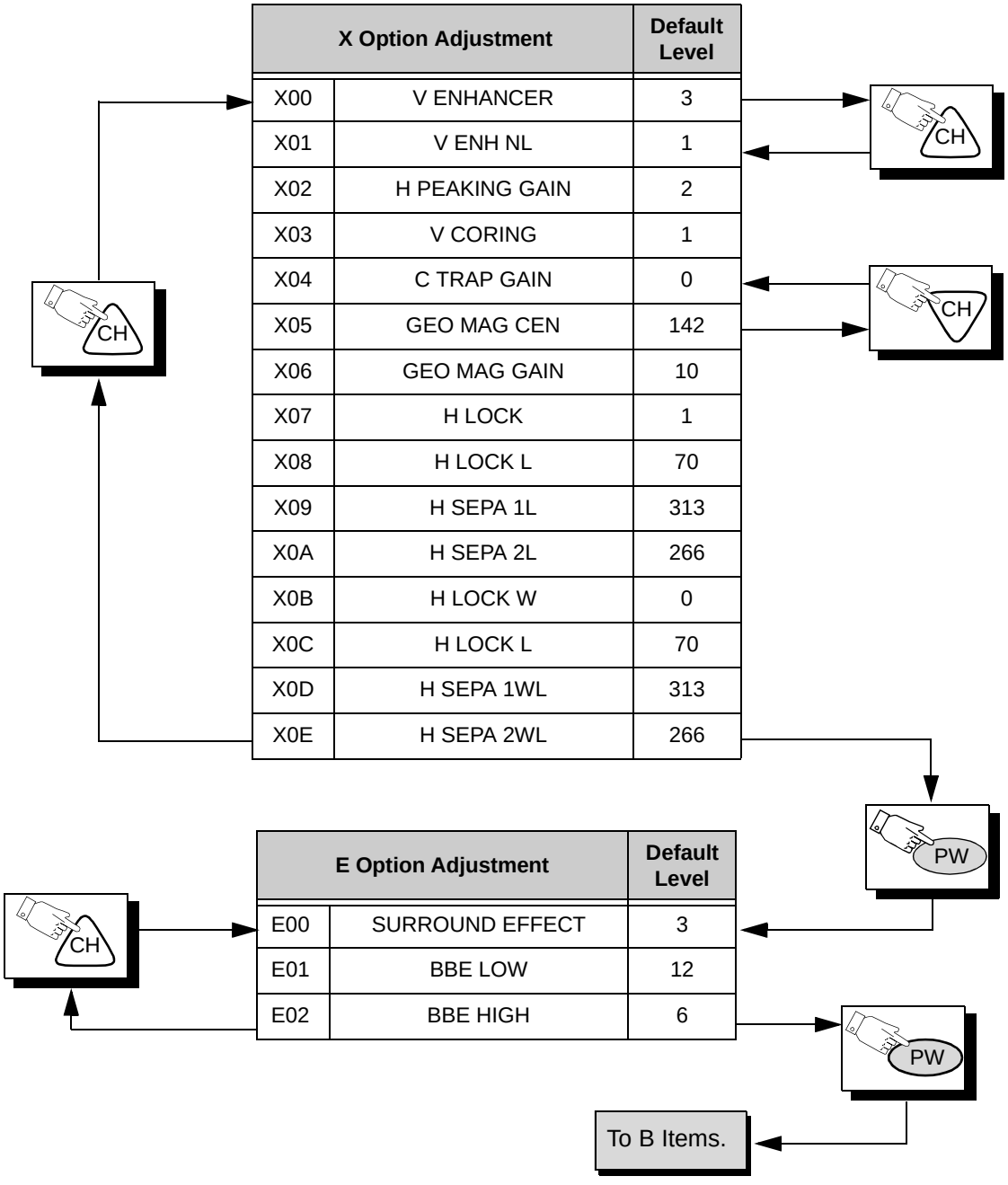
Press the Power Button on the Remote Control to select the Service Adjustment

For Adjustments:

1. **Press Channel Up/Down** on the **Remote Control** to select one of the available Service Adjustments (**a** in Fig. 20).

Note: *Write Down the original value set (**b** in* Fig. 20*) for each address before modifying anything. It is easy to erroneously adjust the wrong item.*

2. **Press Volume Up/Down** on the **Remote Control** to adjust the level of the selected Service Adjustment (**b** in Fig. 20).



X Option Adjustment		Default Level
X00	V ENHANCER	3
X01	V ENH NL	1
X02	H PEAKING GAIN	2
X03	V CORING	1
X04	C TRAP GAIN	0
X05	GEO MAG CEN	142
X06	GEO MAG GAIN	10
X07	H LOCK	1
X08	H LOCK L	70
X09	H SEPA 1L	313
X0A	H SEPA 2L	266
X0B	H LOCK W	0
X0C	H LOCK L	70
X0D	H SEPA 1WL	313
X0E	H SEPA 2WL	266

E Option Adjustment		Default Level
E00	SURROUND EFFECT	3
E01	BBE LOW	12
E02	BBE HIGH	6

To Check Purity:

Press the **Recall** Button on the **Remote Control** when in Service Mode (red “CHK” is displayed) to enter the Purity Field Check Mode.

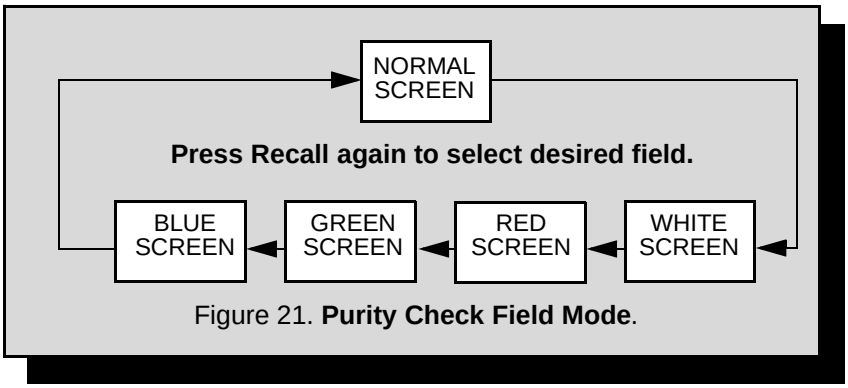


Figure 21. **Purity Check Field Mode**.

Helpful Hints

Entering Service Mode (Back-Open Method)

1. While the Receiver is ON or Plugged and operating in Normal Mode, momentarily short test point **FA1** (TP8) to Cold Ground (⏚) **FA2** (TP3) A-Board.
   The Receiver enters the Aging Mode.
   Yellow letters “CHK” appear in the upper left corner of the CRT.
   (The Volume Up/Down will adjust rapidly).
2. Simultaneously press the **Action** and the **Volume Up** buttons on the **Receiver** Control Panel.
   The Receiver enters the Service Mode.
   The letter in “CHK” turn red.
   (The Volume Up/Down will adjust normally).
   (All customer controls are set to nominal level).

IMPORTANT NOTE:
Always Exit the Service Mode Following Adjustments.

Instructional Flow Chart for Service Mode

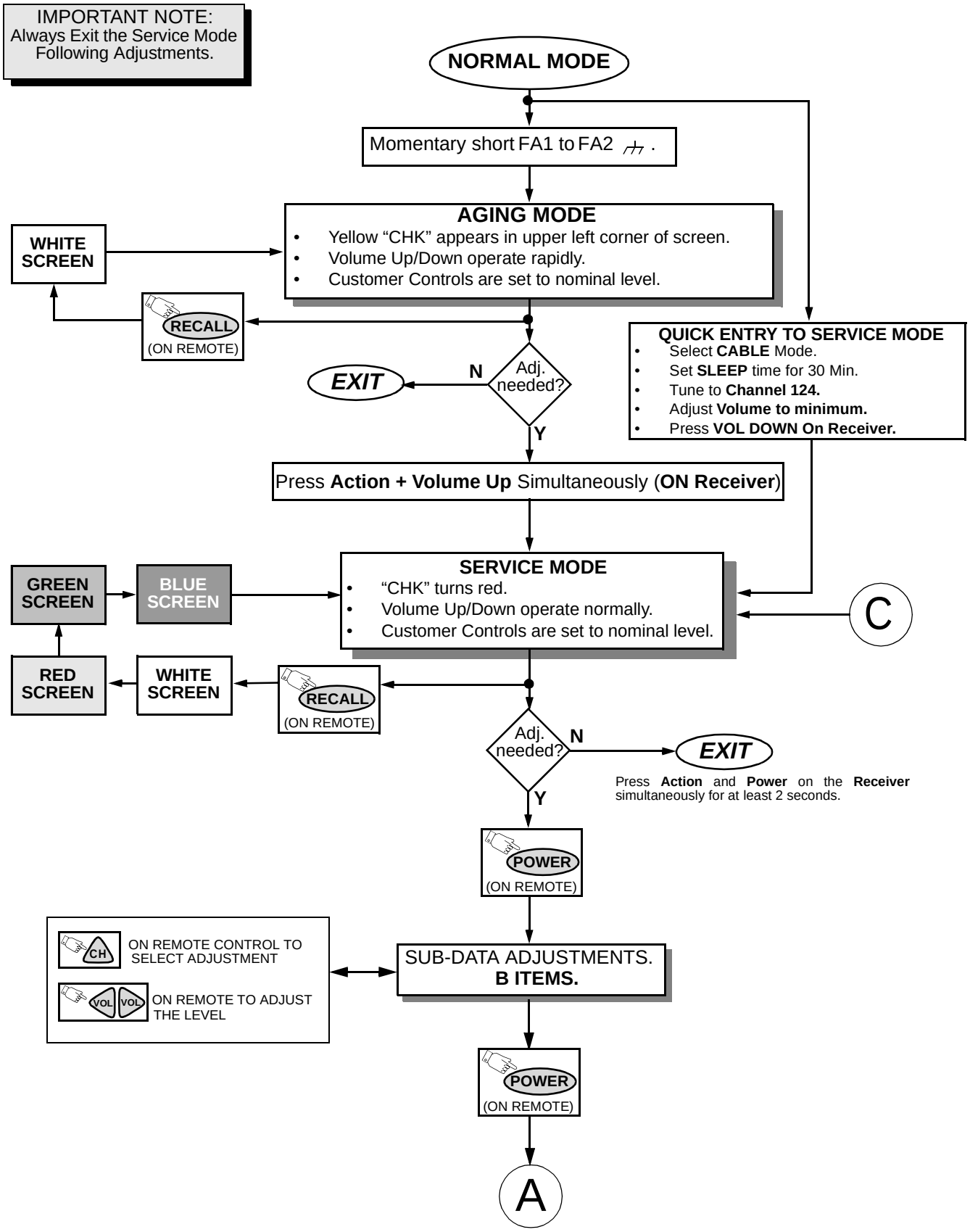
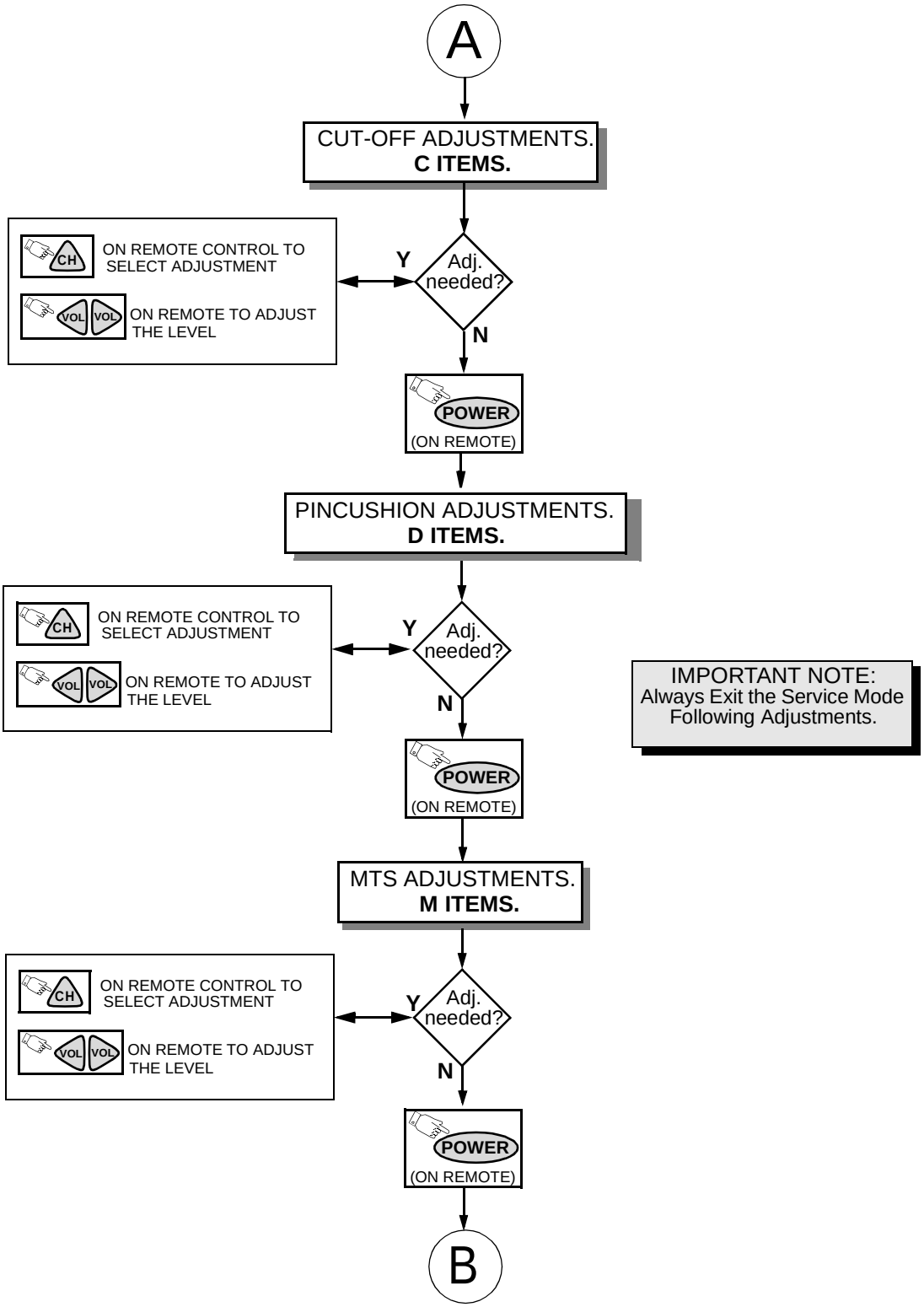
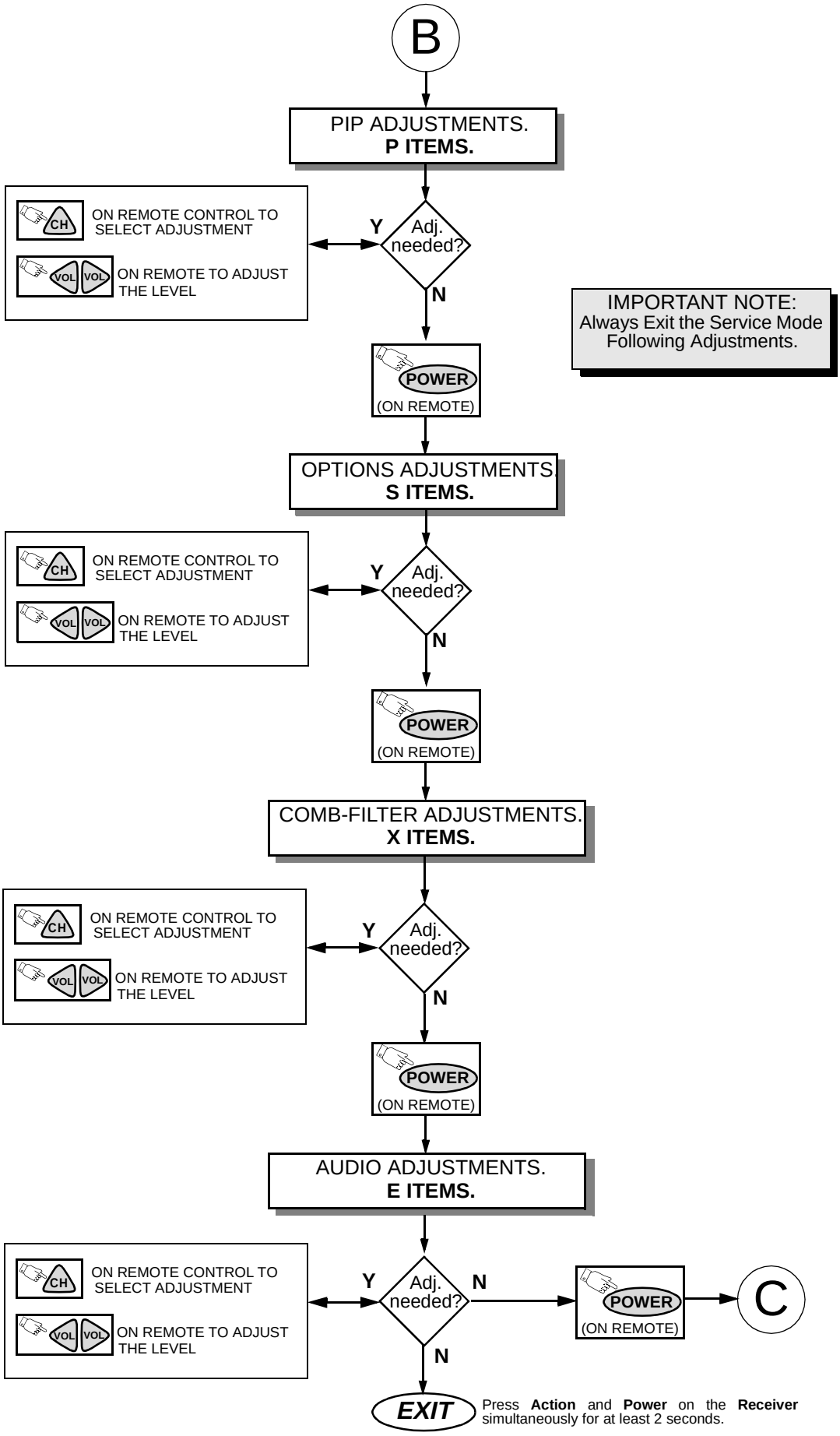


Figure 22. **Flow Chart for Service Mode.**

Instructional Flow Chart for Service Mode - Continued



Instructional Flow Chart for Service Mode - Continued



Service Adjustments (Electronic Controls)

Sub-Contrast Adjustment

Service DAC Adjustment (B02, B03)

This adjustment is factory set. **Do not adjust** unless repairs are made to associated circuit, the CRT Board or when the CRT is replaced.

Preparation:

1. Apply a Black-White pattern.
2. Preset the following controls:
   - Brightness . . . . . Center.
   - Color . . . . . Min.
   - Tint . . . . . Center.
   - Picture . . . . . Max.
   - Sharpness . . . . . Center.
3. RGB GAMMA (S03) DAC from 1 to 0
4. Connect the oscilloscope to TP47R.
5. Connect a jumper from TPD2 to cold ground (⏚).

Procedure:

1. In the Service Mode, select DAC B2 for Sub-Brightness to obtain 1.5V~1.9Vpp between 7.5IRE and GND level at TP47R (See Fig. 23)
2. In the Service Mode, select DAC B03 for Sub-Contrast to obtain 1.3±0.1Vpp between 7.5IRE and 100IRE level at TP47R
3. Remove short jumper and set RGB GAMMA (S03) DAC to 1.
4. Set the picture settings to normal.

.

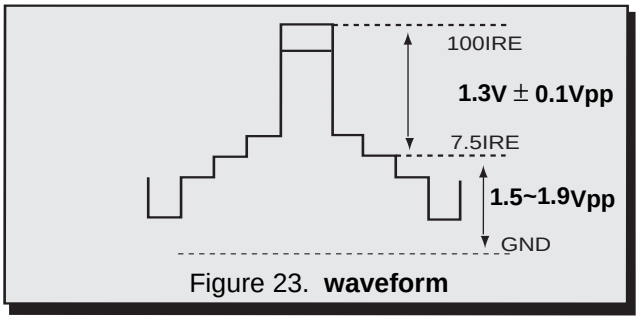


Figure 23. **waveform**

Sub-Brightness (B02)

Adjustment of this control is important for setting proper operation of customer brightness and picture controls. **Do not adjust** the SCREEN VR after the Sub-Brightness is set.

Preparation:

1. Normalize picture settings.
2. Switch COLOR TEMPERATURE to NORMAL.

Procedure:

1. Apply a black white cross pattern.
2. In the Service Mode for making electronic adjustments, select the DAC adjustment (B02) and adjust data so that 7.5IRE part is the same light output as the 3IRE part (See Fig. 24).

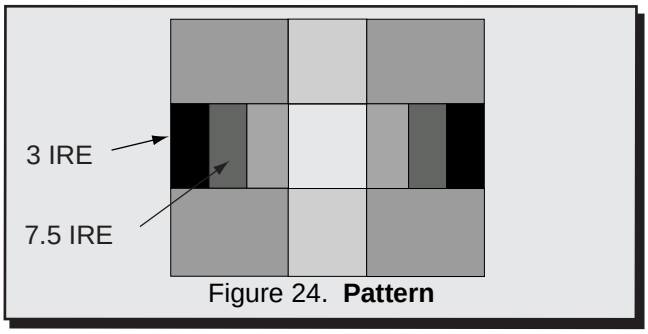


Figure 24. **Pattern**

Tint/Color Adjustment

Service DAC Adjustment (B01) (B00)

Preparation:

1. Apply a rainbow color bar signal.
2. Preset the following controls:
   - Brightness . . . . . Min.
   - Color . . . . . Center.
   - Tint . . . . . Center.
   - Picture . . . . . Max.
   - Sharpness . . . . . Min.
3. Set RGB GAMMA (S03) DAC to 0
4. Connect a jumper from TPD2 to GND (⏚).

Procedure:

1. Connect the oscilloscope to TP47B (A-Board).
2. In the Service Mode, select (B01) DAC Sub-Tint Adjustment. Adjust until the waveform measured is as the one shown in Fig. 25.

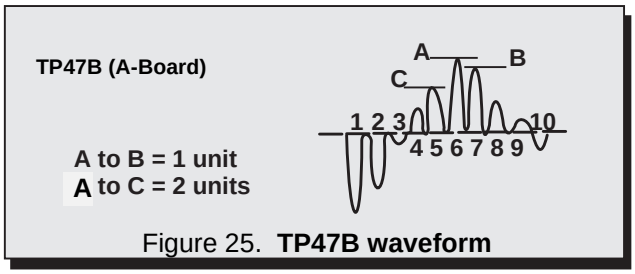


Figure 25. **TP47B waveform**

3. Connect the oscilloscope to TP47R (TPL1) and cold GND.
4. Select DAC Sub-Color Adjustment (B00) and adjust for peak to peak amplitude to be **0.85Vp-p ±0.1V** as shown in Fig. 26.

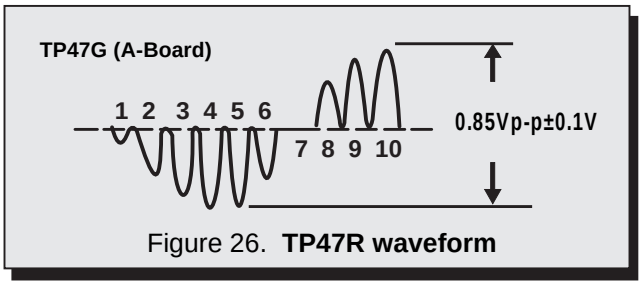


Figure 26. **TP47R waveform**

5. Remove short jumper and set RGB GAMMA (S03) DAC to 1.

PIP Sub-Contrast Adjustment (P03)

Procedure:

1. Connect the oscilloscope to TPY1.
2. Apply a color bar signal in main and PIP (PIP on).
3. In the Service Mode, select the DAC adjustment (P03) for PIP Sub-contrast so that child (PIP) level is 90% of parent (MAIN) signal (See Fig. 27)

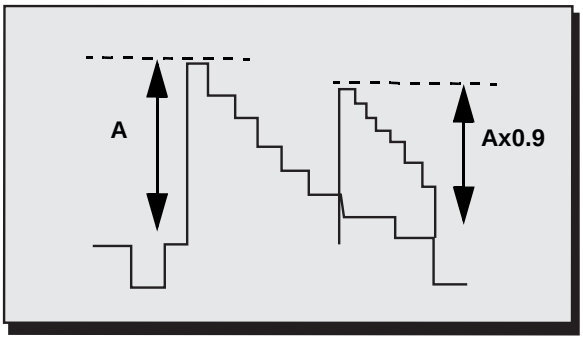


Figure 27. **Waveform**

Color Temperature Adjustment (B/W Tracking)

Service DAC Adjust.
(C00) (C01) (C02) (C04) (C05)
Minor Touch-Up Method

OBSERVE low and high brightness areas of a B/W picture for proper tracking. Adjust only as required for "good gray scale and warm highlights".

1. LOW LIGHT areas – In Service Mode for making electronic adjustments, select Cutoff (C00) RED, (C01) GRN, (C02) BLU and adjust the picture for gray.
2. HIGH LIGHT areas – In Service Mode for making electronic adjustments, select Drive (C04) GRN, (C05) BLU and adjust the picture for warm whites.

Complete Adjustment

Preparation:

1. Turn the Receiver "ON" and allow 30 minutes warm up at high brightness.
2. Apply a color bar signal with color "OFF".
3. Turn the SCREEN control (part of FBT T551) fully counterclockwise.

Procedure:

Preset the following Service DACs for best results:

- C0 128
- C1 128
- C2 128
- C4 64
- C5 64

1. Connect the oscilloscope to TPL1 (C-Board).
2. In Service Mode, select the Sub-Bright DAC (B02).
3. Press the R-Tune key on the remote.
4. Observe the oscilloscope waveform at Horizontal rate and adjust the Service Mode Sub-Bright DAC (B02) level until a scanning period of **2.4V** above DC ground is measured, as indicated in Fig. 28.

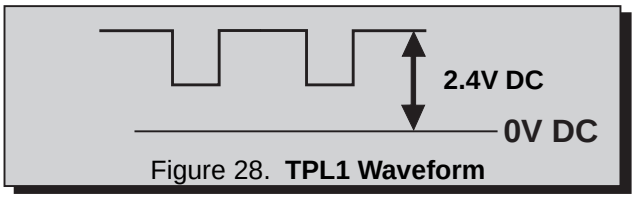


Figure 28. **TPL1 Waveform**

5. Press the R-Tune key on the remote.
6. Connect the scope to RED Cathode (KR) on the CRT-Board.
7. In the Service Mode, select the RED CUTOFF DAC (C00).
8. Press the R-Tune key on the remote.
9. View scope trace at Horizontal rate and adjust the Service Mode DAC (C00) level until a scanning period of **170V** above DC ground is measured, as indicated in Fig. 29.
10. Press the R-Tune key on the remote.
11. Write the same C00 data to C01 and C02.
12. Press the R-Tune key on the remote.
13. Turn the Screen Control (part of FBT) slowly clockwise until a slightly color horizontal line appears.
14. Adjust DAC C01 and C02 until the horizontal line becomes white.
15. Press the R-Tune key on the Remote

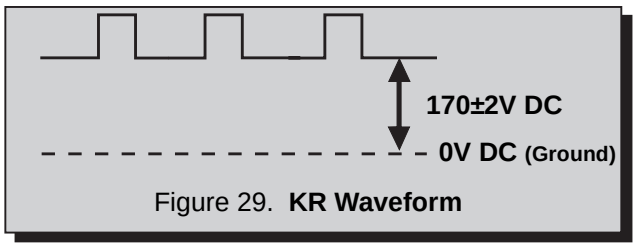


Figure 29. **KR Waveform**

16. In the Service Mode select the DAC DRIVE adjustments (C04) GRN, (C05) BLUE and adjust for warm white in a white color bar pattern.
17. Apply a monoscope pattern and check for a good picture.
18. Perform Minor Touch-Up Method if necessary.
19. EXIT the Service Mode.

Service Adjustments (Electronic Controls, cont.)

Horizontal Centering (D00)

This Adjustment helps to center the picture horizontally

Preparation:

Connect a monoscope pattern signal.

Procedure:

1. In the Service Mode, select the Horizontal Centering Adjustment DAC (D00) and adjust until the center of the monoscope pattern is centered on CRT.
2. EXIT the Service Adjustment Mode.

H-Size Adjustment (D0D)

Preparation:

1. Apply a Monoscope pattern

Procedure:

1. Adjust “D0D” DATA so that width “A” and “B” becomes 5.00±0.40 aprox (when using factory pattern). See Fig. 30

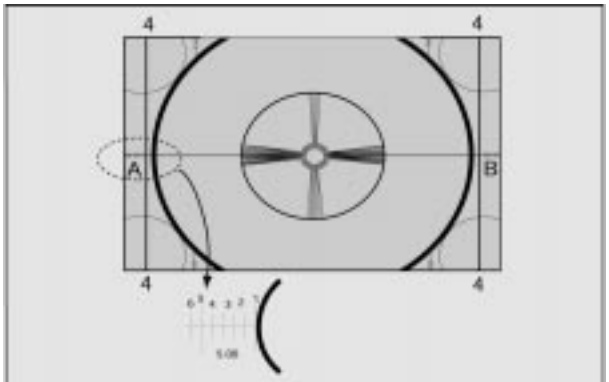


Figure 30. H-Size Adjustment

When using a different pattern, correlate with factory pattern.

2. If correlation is not possible, adjust D0D to obtain a perfect round pattern.

E-W PCC Adjustment (D0C)

This adjustment helps to correct left and right sides of picture.

Preparation:

1. Apply a Crosshatch pattern
2. Normalize the Picture Icon Video adjustments.

Procedure:

1. Adjust “D0C” DATA so that the 1st line and 3rd line make a good balance (See Fig. 31).

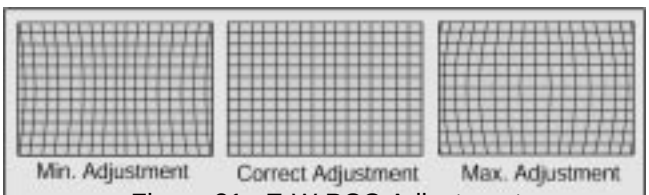


Figure 31. E-W PCC Adjustment

Corner PCC Adjustment (D0B)

Preparation:

1. Apply a Crosshatch pattern
2. Normalize the Picture Icon Video adjustments.

Procedure:

1. To adjust upper and lower linearity.
2. Adjust “D0B” to straighten upper and lower lines (See Fig. 32)

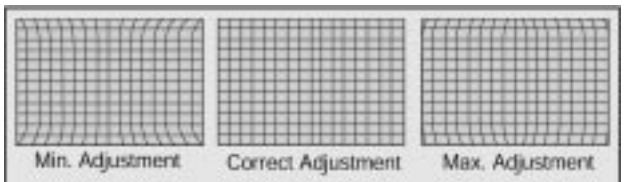


Figure 32. Corner Adjustment

V-Size and V-Position Adjustment (D01 & D07)

Preparation:

1. Apply a Crosshatch pattern.

Procedure:

1. Apply a monoscope pattern.
2. Enter Service Mode
5. Adjust (D07) to center the picture to the marks on the CRT.
5. Adjust (D01) to make circle of monoscope pattern a round circle.

V-Linearity Adjustment (D03)

Preparation:

1. Apply a Crosshatch pattern

Procedure:

1. Enter Service Mode, Adjust linearity data “D03” so that interval of “a” is same as “b” (a=b). (See Fig. 33)

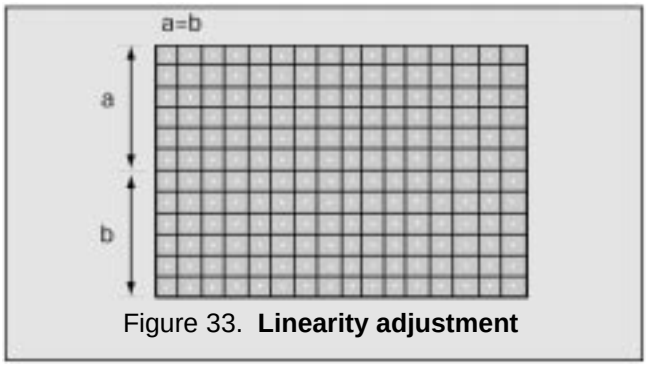


Figure 33. **Linearity adjustment**

V-Correction Adjustment (D02)

Preparation:

1. Apply a Crosshatch pattern.
2. Adjust (D01) so that V-Size is regular size.
3. If b-a<-1.5mm (in top and bottom), increase (D02) by one step and adjust (D01) so that V-Size is regular; repeat steps until b-a≤1.5mm
4. If b-a>-1.5mm (in top and bottom), decrease (D02) by one step and adjust (D01) so that V-Size is regular; repeat steps until b-a≤1.5mm.

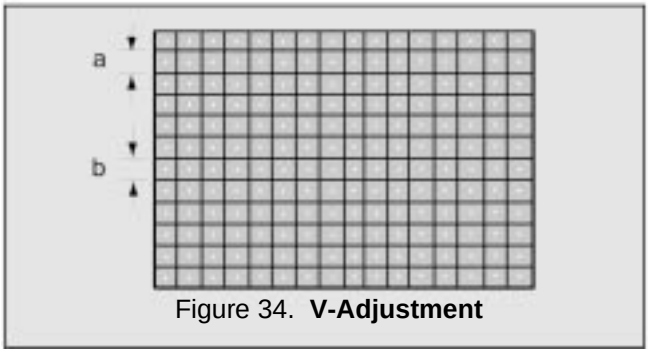


Figure 34. **V-Adjustment**

MTS Circuit Adjustments

The MTS Circuit Adjustments require two steps:

1. Input Level Adjustment.
2. Stereo Separation Adjustment.

Input Level Adjustment (M00)

Preparation:

1. Connect an RMS meter with filter jig as shown in Fig. 35.

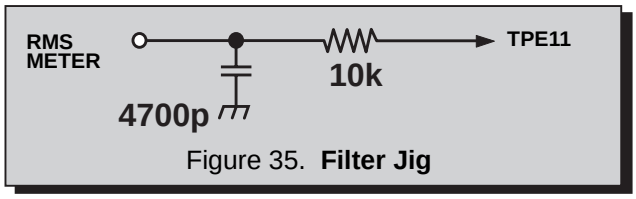


Figure 35. **Filter Jig**

2. Connect an RF signal generator to the RF antenna input.

Procedure:

1. Apply the following signal from the RF signal generator:
   Video: 100 IRE flat field, 30% modulation.
   Audio: 300Hz, 100% modulation, monaural (70 ±5dB, 75Ω OPEN, P/S 10dB).
2. Adjust the MTS Input Level Adjustment (M0) until the voltage measured is 106 ± 6.0mV rms.

Stereo Separation Adjustment (M01 & M02)

Preparation:

1. Connect an RF signal generator to the RF antenna input.
2. Connect oscilloscope to TPE10.

Procedure:

1. Select Stereo Mode in Audio menu
2. Apply the following signal from the RF signal generator:
   Video: 100 IRE flat field, 30% modulation.
   Audio: 300Hz, 100% modulation, stereo (left only) (70 ±5dB, 75Ω OPEN, P/S 10dB).
3. Adjust the MTS Low-Level Separation Adjustment (M01) until the amplitude displayed on the scope is minimum.
4. Apply the following signal from the RF signal generator:

   Video: 100 IRE flat field, 30% modulation.

   Audio: 3KHz, 100% modulation, stereo (left only) (70 ±5dB, 75Ω OPEN, P/S 10dB).
5. Adjust the MTS High-Level Separation Adjustment (M02) until the amplitude displayed on the scope is minimum.
6. Repeat above steps 2 through 5 until the amplitude is minimum for both signals.

Service Adjustments (Electronic Controls, cont.)

Clock Adjustment (S07)

Preparation:

Connect the frequency counter to TPS1 (IC001 pin-13) and cold ground (⏚).

Note: *Frequency Counter probe capacitance should be 8pF or less.*

Procedure:

1. Measure TPS1 (IC001 pin 13) for the frequency of the waveform and record the reading.

Note: *Pin 13 measurement must have at least four digits of resolution following the decimal point. Example: 000.0000*

2. Place the Receiver into Service Mode for making electronic adjustment, select the Clock Adjustment DAC (S07).
3. Calculate and set S07 based on the following formula:

$$S07 = 128 + \{873.90625 - pin13[Hz]\}968$$

Figure 36. **Set Turned ON**

$$S07 = 128 + \{218.47656 - pin13[Hz]\}3873$$

Figure 37. **Set Turned OFF**

Note: *Pin 13 measurement will not change regardless of the value stored in S07.*

Service Adjustments (Mechanical Controls)

Focus (part of T551)

This adjustment is to make the picture clear

Preparation:

Connect a Signal generator and select a dot pattern.

Procedure:

Adjust the FOCUS controls to obtain the sharpest and clearest dot pattern.

a. Adjust VF1 to minimize width on vertical lines on corners.
b. Adjust VF2 to minimize width on horizontal lines on corners.

Audio Signal Path Block Diagram

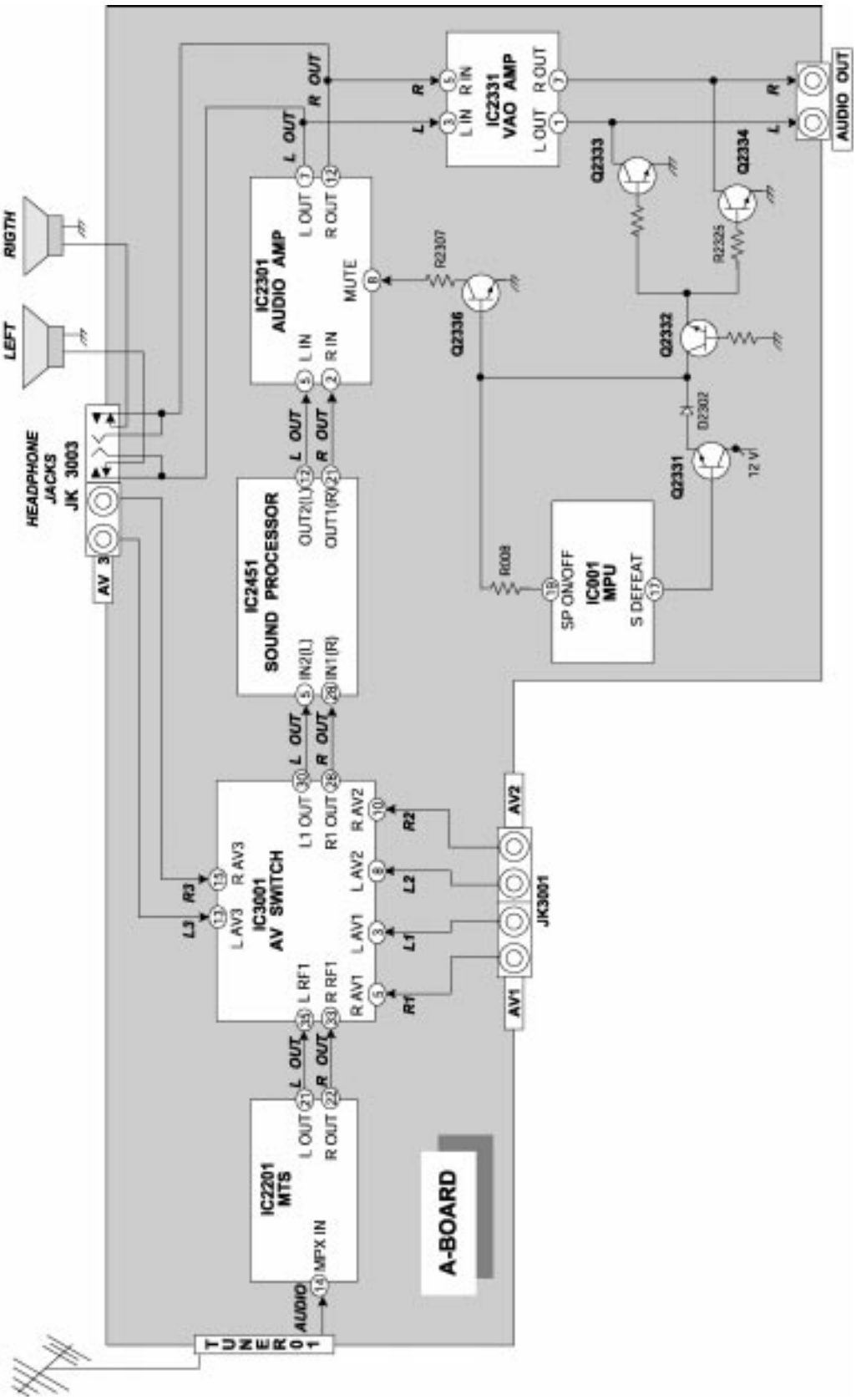


Figure 38. **Audio Signal Path Block Diagram.**

Video Signal Path Block Diagram
No-PIP Models

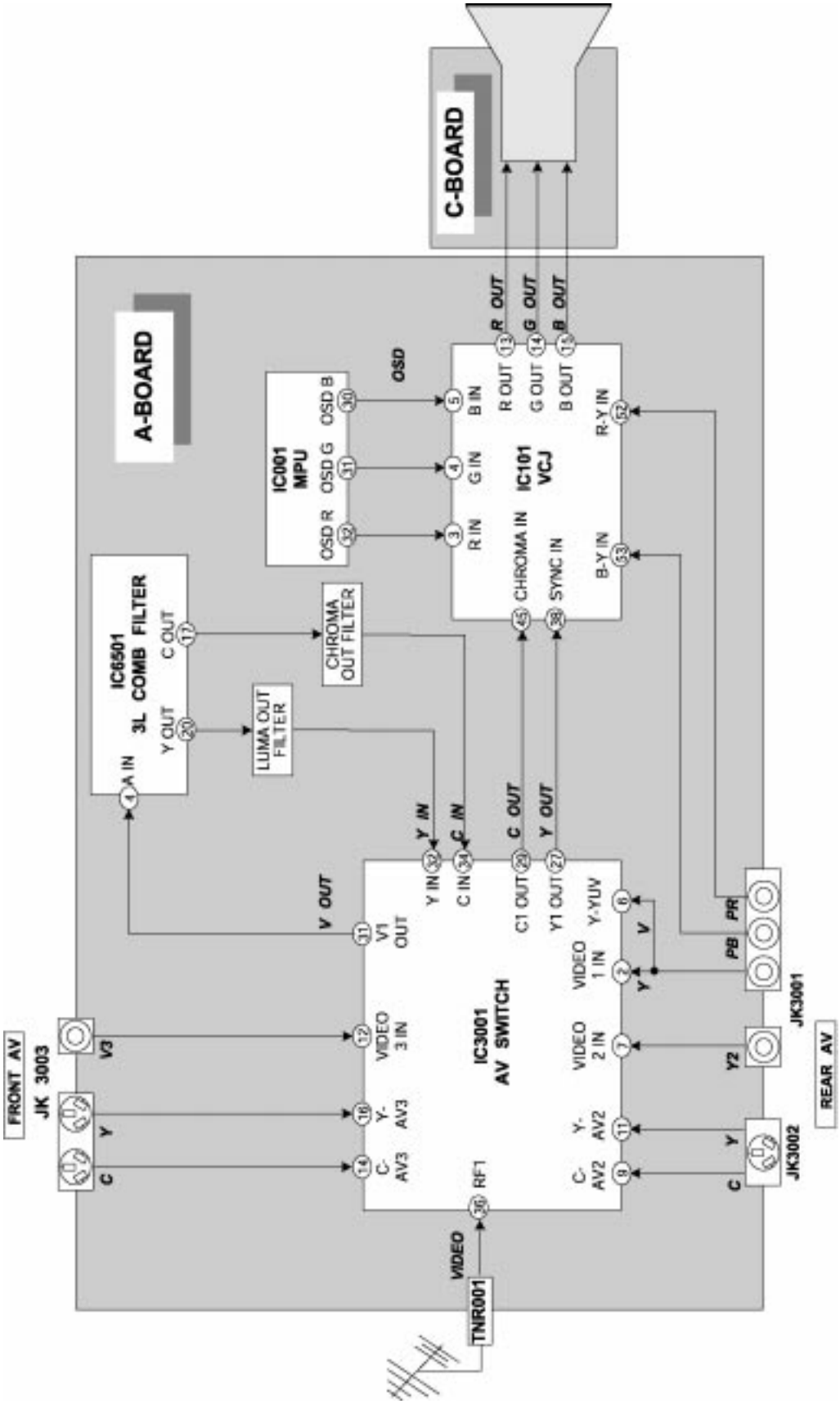


Figure 39. No-PIP Video Signal Path Block Diagram.

Video Signal Path Block Diagram
2-Tuner PIP Models

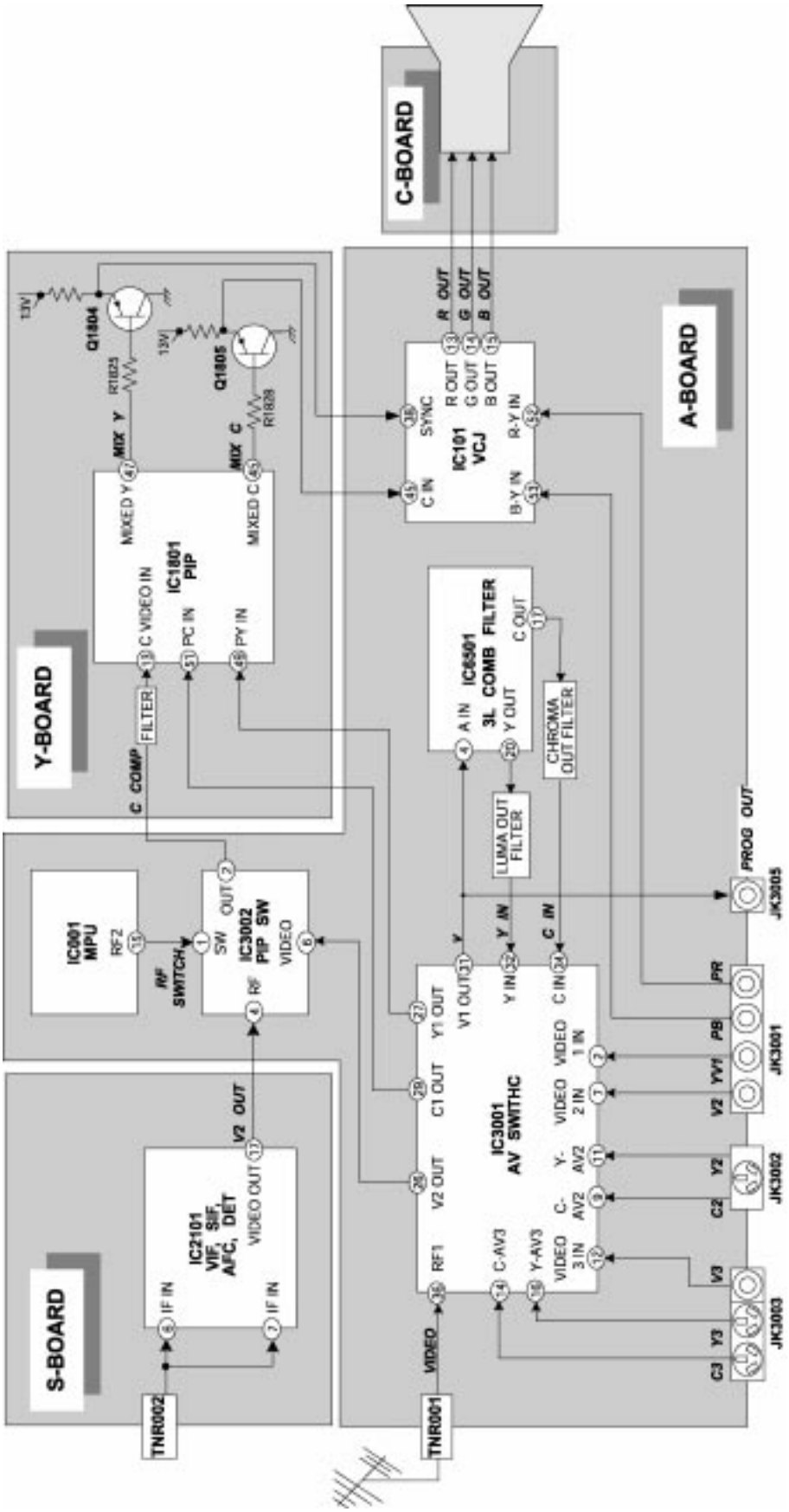


Figure 40. 2-Tuner PIP Video Signal Path Block Diagram.

REPLACEMENT PARTS LIST

Model:CT-27SX31E/UE/CE & CT-27SX11E/UE/CE

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
		CAPRISTORS
CRA801	TP00842-51	TAPING GAP TERMINAL
CRA802	TP00842-51	TAPING GAP TERMINAL
		CAPACITORS
C001	ECA1CM470B	CAP,E 47UF/16V
C002	TCJ2VF1H103Z	CAP,C .01UF-Z-50V
C003	ECEA1HKA4R7B	CAP,E 4.7UF-50V
C005	ECA1CM470B	CAP,E 47UF/16V
C006	TCJ2VF1H103Z	CAP,C .01UF-Z-50V
C008	TCJ2VF1H103Z	CAP,C .01UF-Z-50V
C010	TCJ2VF1H103Z	CAP,C .01UF-Z-50V
C013	ECA0JM101B	CAP,E 100UF-6.3V
C014	TCJ2VC1H390J	CAP,C 39PF-J-50V
C015	TCJ2VC1H120J	CAP,C 12PF-J-50V
C017	TCJ2VC1H270J	CAP,C 27PF-J-50V
C018	TCJ2VC1H270J	CAP,C 27PF-J-50V
C020	ECA0JM331B	CAP,E 330UF-6.3V
C021	TCJ2VF1H103Z	CAP,C .01UF-Z-50V
C024	ECA1HM4R7B	CAP,E 4.7UF-50V
C025	ECA1HM010B	CAP,E 1UF-50V
C026	ECA1HM010B	CAP,E 1UF-50V
C032	ECA1CM331B	CAP,E 330UF-16V
C033	TCJ2VC1H680J	CAP,C 68PF-J-50V
C034	TCJ2VC1H680J	CAP,C 68PF-J-50V
C043	ECA1HM2R2B	CAP,E 2.2UF-50V
C044	TCJ2VF1H103Z	CAP,C .01UF-Z-50V
C047	ECA0JM102B	CAP,E 1000UF-6.3V
C048	TCJ2VF1H103Z	CAP,C .01UF-Z-50V
C052	TCJ2VC1H101J	CAP,C 100PF-J-50V
C053	ECA1HM010B	CAP,E 1UF-50V
C081	ECA1HM010B	CAP,E 1UF-50V *CT-27SX31E/CE/UE*
C201	TCJ2VB1C104K	CAP,C .1UF-K-16V
C224	TCJ2VB1C104K	CAP,C .1UF-K-16V
C225	TCJ2VB1C104K	CAP,C .1UF-K-16V
C226	TCJ2VB1C104K	CAP,C .1UF-K-16V
C301	TCJ2VB1C104K	CAP,C .1UF-K-16V
C302	TCJ2VB1C104K	CAP,C .1UF-K-16V
C303	TCJ2VB1C104K	CAP,C .1UF-K-16V
C307	ECA1HM0R1B	CAP,E 0.1UF/50V
C309	TCJ2VC1H390J	CAP,C 39PF-J-50V *CT-27SX31E/CE/UE*
C310	TCJ2VC1H390J	CAP,C 39PF-J-50V
C314	EEANA1E1R0B	CAP,E 1.0UF-25V *CT-27SX31E/CE/UE*
C315	EEANA1E1R0B	CAP,E 1.0UF-25V
C320	TCJ2VF1H104Z	CAP,C .1UF-Z-50V
C321	TCJ2VB1H103K	CAP,C .01UF-K-50V
C322	TCJ2VB1H103K	CAP,C .01UF-K-50V
C323	TCJ2VB1H103K	CAP,C .01UF-K-50V
C324	TCJ2VF1H104Z	CAP,C .1UF-Z-50V
C330	ECA1AM101B	CAP,E 100UF-10V

REF NO.	PART NO.	DESCRIPTION
C331	TCJ2VF1H103Z	CAP,C .01UF-Z-50V
C337	ECA1HM2R2B	CAP,E 2.2UF-50V
C342	ECA1HM010B	CAP,E 1UF-50V
C351	TACCV470T50V	CAP,C 47PF/50V
C352	TACCV330T50V	CAP,C 33PF/50V
C353	TACCV330T50V	CAP,C 33PF/50V
C359	ECQM4104KZB	CAP,P .10UF-K-400V
C368	ECQV1H224JL3	CAP,P .22UF-J-50V
C370	ECKW3D102KBN	CAP,C .001UF-K-2KVDC
C371	ECEA1HN010UB	CAP,E 1UF/50V
C373	ECA2EHG100B	CAP,E 10UF-250V
C377	ECA1CM221B	CAP,E 10UF-16V
C401	TCJ2VB1C104K	CAP,C .1UF-K-16V
C402	TCJ2VB1H102K	CAP,C 1000PF-K-50V
C403	ECA1HM010B	CAP,E 1UF-50V
C404	ECA1HM010B	CAP,E 1UF-50V
C405	ECSF1EE105VB	CAP,E 1.0UF-25V
C407	ECA1HM220B	CAP,E 22UF-50V
C409	TCJ2VC1H101J	CAP,C 100PF-J-50V
C410	TCJ2VB1C104K	CAP,C .1UF-K-16V
C415	TCJ2VF1H104Z	CAP,C .1UF-Z-50V
C453	EEUNA1E220B	CAP,E 22UF-25V
C454	ECA1HHG221B	CAP,E 220UF-50V
C456	ECQB1104JF3	CAP,P .10UF-J-100V
C458	ECKR1H221KB5	CAP,C 220PF-K-50V
C459	ECQB1224KF3	CAP,P .22UF-K-100V
C460	ECA1VM221B	CAP,E 220UF-35V
C461	ECA1VM470B	CAP,E 47UF/35V
C462	ECA1VM221B	CAP,E 220UF-35V
C463	ECQB1H103JM3	CAP,P .01UF-J-50V
C465	ECA1CM101B	CAP,E 100UF/16V
C470	ECQB1H104JM3	CAP,P .1UF-J-50V
C471	ECQB1H104JM3	CAP,P .1UF-J-50V
C495	ECQB1H683JM3	CAP,P .068UF-J-50V
C504	ECQB1H222JM3	CAP,P 2200PF-J-50V
C505	TCJ2VC1H180J	CAP,C 18PF-J-50V
C506	ECA1CM471B	CAP,E 470UF-16V
C507	TCJ2VF1H103Z	CAP,C .01UF-Z-50V
C511	ECKR2H271KB5	CAP,C 270PF-K-500W
C512	ECKR2H152KB5	CAP,C .0015UF-K-500V
C514	ECA1HMR22B	CAP,E .22UF-50V
C519	TCJ2VF1H104Z	CAP,C .1UF-Z-50V
C535	TCJ2VC1H120J	CAP,C 12PF-J-50V
C548	**ECWH16103JVB**	**CAP,P .01UF-J-1.5KV**
C549	**ECQM4473JZW**	**CAP,P .063UF-J-100V**
C550	**ECA160V33UE**	**CAP,E 33UF/160V**
C552	**ECQM6332JZW**	**CAP,P .63UF-J-100V**
C553	ECWF2754JBB	CAP,M .27UF-J-200V
C554	**ECKW3D102JBR**	**CAP,C 1000PF-J-500V**
C555	ECA160V33UE	CAP,E 33UF/160V

REPLACEMENT PARTS LIST

Model:CT-27SX31E/UE/CE & CT-27SX11E/UE/CE

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
C556	**ECWH20182JVY**	**CAP,P 1500PF-J-2KV**
C557	ECA1CM100B	CAP,E 10UF-16V
C558	**ECKW3D561JBR**	**CAP,C 560PF-K-2KV**
C559	ECKW3D681KBP	CAP,C 680PF-K-2KV
C560	ECKR2H102KB5	CAP,C 1000PF-K-500V
C561	**ECQB1H273JM3**	**CAP,M .27UF-J-50V**
C562	ECKR2H471KB5	CAP,C 470PF-K-500V
C563	**ECA1EM102E**	**CAP,E 1000UF-25V**
C564	ECKR2H471KB5	CAP,C 470PF-K-500W
C565	**ECA1EM102E**	**CAP,E 1000UF-25V**
C566	ECKR2H471KB5	CAP,C 470PF-K-500W
C567	**ECA1CM471B**	**CAP,E 470UF-16V**
C569	**ECWF23044JBB**	**CAP,P .27UF-J-200V**
C570	**ECA2EM220E**	**CAP,E 22UF-250V**
C571	ECKR2H102KB5	CAP,C 1000PF-K-500V
C572	**ECWF2334JBB**	**CAP,P .33UF-J-200V**
C573	ECQE2474KFW	CAP,P .47UF-K-200V
C580	**ECA1HM4R7B**	**CAP,E 4.7UF-50V**
C581	ECA1CM471B	CAP,E 470UF-16V
C582	ECA1CM101B	CAP,E 100UF/16V
C583	ECA1CM100B	CAP,E 10UF-16V
C593	ECEA1HNR47UB	CAP,E .47UF-50V
C595	ECA1HM100B	CAP,E 10UF/50V
C601	TCJ2VF1H103Z	CAP,C .01UF-Z-50V
C603	ECQB1H223JM3	CAP,P .022UF-J-50V
C616	TCJ2VB1C104K	CAP,C .1UF-K-16V
C619	TCJ2VF1H103Z	CAP,C .01UF-Z-50V
C628	TCJ2VC1H151J	CAP,C 150PF-J-50V
C632	TCJ2VB1H103K	CAP,C .01UF-K-50V
C641	ECA1CM100B	CAP,E 10UF-16V
C701	TCJ2VF1H103Z	CAP,C .01UF-Z-50V
C750	TCJ2VC1H181J	CAP,C 180PF-J-50V
C751	ECQE1335KFB	CAP,P 3.3UF-K-100V
C752	ECA1VM470B	CAP,E 47UF/35V
C753	ECQB1H222JM3	CAP,P 2200PF-J-50V
C754	TCJ2VB1H332K	CAP,C .0033UF-K-50V
C755	TCJ2VB1H273K	CAP,C .027UF-K-50V
C756	ECKR2H332KB5	CAP,C 3300PF-K-550V
C763	ECKR3A121KBP	CAP,C 120PF-K-1KV
C801	**ECKWAE472ZED**	**CAP,C 4700PF-Z-500V**
C802	**ECKWAE472ZED**	**CAP,C 4700PF-Z-500V**
C803	**ECKWAE472ZED**	**CAP,C 4700PF-Z-500V**
C804	**ECKWAE472ZED**	**CAP,C 4700PF-Z-500V**
C805	**EC0S2DA561BB**	**CAP,E 560PF-200V**
C806	ECQB1H104JM3	CAP,P .1UF-J-50V
C807	ECQB1H103JM3	CAP,P .01UF-J-50V
C809	ECKR3A222KBP	CAP,C .0022UF-K-1KV
C812	**ECQU2A224MVA**	**CAP,P .22UF-M-250VAC**
C813	**ECQU2A153MVA**	**CAP,P .015UF-M-250VAC**
C814	**ECQU2A153MVA**	**CAP,P .015UF-M-250VAC**

REF NO.	PART NO.	DESCRIPTION
C815	ECQB1H104JM3	CAP,P .1UF-J-50V
C816	ECQB1H473JM3	CAP,P .047UF-J-50V
C817	**ECQU2A224MVA**	**CAP,P .22UF-M-250VAC**
C818	ECQB1H103JM3	CAP,P .01UF-J-50V
C819	**ECKCNB102MB**	**CAP,C 1000PF-M-250V**
C820	**ECKCNB102MB**	**CAP,C 1000PF-M-250V**
C821	**ECA1HM471E**	**CAP,E 470UF-50V**
C822	ECKR3A471KBP	CAP,C 470PF-K-1KV
C823	ECA1CHG101B	CAP,E 100UF-16V
C824	ECKR3A821KBP	CAP,C 820PF-K-1KV
C825	**EEUMG2C221S**	**CAP,E 220UF-160V**
C826	ECKR3A821KBP	CAP,C 820PF-K-1KV
C827	**ECA1CM102B**	**CAP,E 1000UF/16V**
C828	ECKR1H471KB5	CAP,C 470PF-K-50V
C831	ECKR3A221KBP	CAP,C 220PF-K-1KV
C832	ECKR3A471KBP	CAP,C 470PF-K-1KV
C833	ECA1HM4R7B	CAP,E 4.7UF-50V
C835	**ECA1EM101B**	**CAP,E 100UF-25V**
C901	TCJ2VF1H103Z	CAP,C .01UF-Z-50V
C902	TCJ2VC1H561J	CAP,C 560PF-J-50V
C904	ECKR1H103ZF5	CAP,C .01UF-Z-50V
C952	ECA1HM100B	CAP,E 10UF/50V
C953	ECKR1H103ZF5	CAP,C .01UF-Z-50V
C958	ECA2CM470E	CAP,E 47UF-160V
C959	ECKW2H103ZF7	CAP,C .01UF-Z-500V
C960	ECCR2H151J5	CAP,C 150-500V
C961	ECA2AM100B	CAP,E 10UF-100V
C962	ECKW2H103ZF7	CAP,C .01UF-Z-500V
C963	ECCR1H151J5	CAP DISC 150-5-50V
C964	ECA1CHG101B	CAP,E 100UF-16V
C966	ECA1CHG101B	CAP,E 100UF-16V
C967	ECA1CM221B	CAP,E 10UF-16V
C968	ECKR1H103ZF5	CAP,C .01UF-Z-50V
C969	ECKR1H103ZF5	CAP,C .01UF-Z-50V
C971	TACCW222T50V	CAP,C 2200PF/50V
C1801	TCJ2VF1H103Z	CAP,C .01UF-Z-50V *CT-27SX31E/CE/UE*
C1802	ECQV1H154JM3	CAP,P .15UF-J-50V *CT-27SX31E/CE/UE*
C1803	ECA1HMR22B	CAP,E .22UF-50V *CT-27SX31E/CE/UE*
C1804	ECEA1HKAR22B	CAP,E .22UF-50V *CT-27SX31E/CE/UE*
C1805	TCJ2VF1H333Z	CAP,C .033UF-Z-50V *CT-27SX31E/CE/UE*
C1806	TCJ2VF1H103Z	CAP,C .01UF-Z-50V *CT-27SX31E/CE/UE*
C1807	ECA1CM470B	CAP,E 47UF/16V *CT-27SX31E/CE/UE*
C1808	TCJ2VF1H103Z	CAP,C .01UF-Z-50V *CT-27SX31E/CE/UE*
C1809	ECA1CM470B	CAP,E 47UF/16V *CT-27SX31E/CE/UE*

REPLACEMENT PARTS LIST

Model:CT-27SX31E/UE/CE & CT-27SX11E/UE/CE

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REF NO.	PART NO.	DESCRIPTION
C1810	TCJ2VF1H104Z	CAP,C .1UF-Z-50V *CT-27SX31E/CE/UE*
C1811	TCJ2VF1H103Z	CAP,C .01UF-Z-50V *CT-27SX31E/CE/UE*
C1812	TCJ2VF1H103Z	CAP,C .01UF-Z-50V *CT-27SX31E/CE/UE*
C1813	TCJ2VF1H103Z	CAP,C .01UF-Z-50V *CT-27SX31E/CE/UE*
C1814	ECA1CM470B	CAP,E 47UF/16V *CT-27SX31E/CE/UE*
C1815	TCJ2VF1H104Z	CAP,C .1UF-Z-50V *CT-27SX31E/CE/UE*
C1816	TCJ2VF1H103Z	CAP,C .01UF-Z-50V *CT-27SX31E/CE/UE*
C1817	TCJ2VF1H103Z	CAP,C .01UF-Z-50V *CT-27SX31E/CE/UE*
C1818	ECA1CM100B	CAP,E 10UF-16V *CT-27SX31E/CE/UE*
C1819	TCJ2VF1H104Z	CAP,C .1UF-Z-50V *CT-27SX31E/CE/UE*
C1820	ECA1CM470B	CAP,E 47UF/16V *CT-27SX31E/CE/UE*
C1821	TCJ2VC1H150J	CAP,C 15PF-J-50V *CT-27SX31E/CE/UE*
C1822	TCJ2VC1H120J	CAP,C 12PF-J-50V *CT-27SX31E/CE/UE*
C1823	TCJ2VC1H680J	CAP,C 68PF-J-50V *CT-27SX31E/CE/UE*
C1826	TCJ2VF1H103Z	CAP,C .01UF-Z-50V *CT-27SX31E/CE/UE*
C1827	TCJ2VF1H103Z	CAP,C .01UF-Z-50V *CT-27SX31E/CE/UE*
C1828	TCJ2VF1H103Z	CAP,C .01UF-Z-50V *CT-27SX31E/CE/UE*
C1829	TCJ2VF1H104Z	CAP,C .1UF-Z-50V *CT-27SX31E/CE/UE*
C1830	TCJ2VC1H560J	CAP,C 56PF-J-50V *CT-27SX31E/CE/UE*
C1831	TCJ2VF1H104Z	CAP,C .1UF-Z-50V *CT-27SX31E/CE/UE*
C1832	TCJ2VF1H104Z	CAP,C .1UF-Z-50V *CT-27SX31E/CE/UE*
C1833	TCJ2VF1H104Z	CAP,C .1UF-Z-50V *CT-27SX31E/CE/UE*
C1835	ECA1CM100B	CAP,E 10UF-16V *CT-27SX31E/CE/UE*
C1836	TCJ2VC1H680J	CAP,C 68PF-J-50V *CT-27SX31E/CE/UE*
C1837	TCJ2VF1H104Z	CAP,C .1UF-Z-50V *CT-27SX31E/CE/UE*
C1839	TCJ2VC1H680J	CAP,C 68PF-J-50V *CT-27SX31E/CE/UE*
C1840	TCJ2VC1H680J	CAP,C 68PF-J-50V *CT-27SX31E/CE/UE*
C2105	ECA0JM101B	CAP,E 100UF-6.3V
C2106	ECA1HMR47B	CAP,E .47UF-50V *CT-27SX31E/CE/UE*

REF NO.	PART NO.	DESCRIPTION
C2108	ECA1CM330B	CAP,E 33UF-16V *CT-27SX31E/CE/UE*
C2109	TCJ2VF1H103Z	CAP,C .01UF-Z-50V *CT-27SX31E/CE/UE*
C2111	ECEA1HFSR22B	CAP,E .22UF-50V *CT-27SX31E/CE/UE*
C2114	TCJ2VF1H103Z	CAP,C .01UF-Z-50V *CT-27SX31E/CE/UE*
C2115	ECA1HM100B	CAP,E 10UF/50V *CT-27SX31E/CE/UE*
C2116	TCJ2VF1H103Z	CAP,C .01UF-Z-50V *CT-27SX31E/CE/UE*
C2118	TCJ2VC1H270J	CAP,C 27PF-J-50V *CT-27SX31E/CE/UE*
C2119	TCJ2VF1H103Z	CAP,C .01UF-Z-50V *CT-27SX31E/CE/UE*
C2120	ECEA1HFSR47B	CAP,E .47UF-50V *CT-27SX31E/CE/UE*
C2121	TCJ2VF1H103Z	CAP,C .01UF-Z-50V *CT-27SX31E/CE/UE*
C2123	TCJ2VC1H270J	CAP,C 27PF-J-50V *CT-27SX31E/CE/UE*
C2124	TCJ2VF1H103Z	CAP,C .01UF-Z-50V *CT-27SX31E/CE/UE*
C2125	ECA1CM100B	CAP,E 10UF-16V *CT-27SX31E/CE/UE*
C2126	ECA1HMR22B	CAP,E .22UF-50V *CT-27SX31E/CE/UE*
C2202	ECA1HM2R2B	CAP,E 2.2UF-50V
C2203	ECA1HM4R7B	CAP,E 4.7UF-50V
C2204	AP106K016CAE	CAP,T 10UF/16V
C2205	ECA1HM010B	CAP,E 1UF-50V
C2206	ECQB1H223JM3	CAP,P .022UF-J-50V
C2207	AP335K016CAE	CAP,T 3.3UF/16V
C2208	TCJ2VB1C104K	CAP,C .1UF-K-16V
C2209	TCJ2VB1C104K	CAP,C .1UF-K-16V
C2210	TCJ2VB1C104K	CAP,C .1UF-K-16V
C2211	ECA1CM100B	CAP,E 10UF-16V
C2212	ECQB1H473JM3	CAP,P .047UF-J-50V
C2215	ECA0JM101B	CAP,E 100UF-6.3V
C2218	ECA1HMR47B	CAP,E .47UF-50V
C2220	TCJ2VC1H100D	CAP,C 10PF-J-50V
C2302	ECA1HM010B	CAP,E 1UF-50V
C2305	ECA1HM010B	CAP,E 1UF-50V
C2307	ECA1EM102E	CAP,E 1000UF-25V
C2308	ECA1HM101B	CAP,E 100UF-50V
C2311	ECA1HM010B	CAP,E 1UF-50V
C2312	ECA1EM102E	CAP,E 1000UF-25V
C2313	ECA1VM102E	CAP,E 1000UF-35V
C2314	ECA1CM101B	CAP,E 100UF/16V
C2331	ECA1HM010B	CAP,E 1UF-50V
C2332	ECA1HM010B	CAP,E 1UF-50V
C2333	ECA1EM100B	CAP,E 10UF-25V
C2334	ECA1EM100B	CAP,E 10UF-25V

REPLACEMENT PARTS LIST

Model:CT-27SX31E/UE/CE & CT-27SX11E/UE/CE

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REF NO.	PART NO.	DESCRIPTION
C2335	ECA1HM010B	CAP,E 1UF-50V
C2336	ECA1HM010B	CAP,E 1UF-50V
C2337	ECA1CM470B	CAP,E 47UF/16V
C2431	ECA1HM010B	CAP,E 1UF-50V
C2432	ECA1HM010B	CAP,E 1UF-50V
C2433	TCJ2VC1H222J	CAP,C 2200PF-J-50V
C2437	TCJ2VB1H333K	CAP,C .033UF-K-50V
C2438	TCJ2VB1H102K	CAP,C 1000PF-K-50V
C2444	TCJ2VB1C104K	CAP,C .1UF-K-16V
C2445	TCJ2VB1C104K	CAP,C .1UF-K-16V
C2449	TCJ2VB1H333K	CAP,C .033UF-K-50V
C2450	TCJ2VB1H102K	CAP,C 1000PF-K-50V
C2451	ECEA1CN100UB	CAP,E 10UF-16V
C2459	TCJ2VB1H333K	CAP,C .033UF-K-50V
C2460	TCJ2VB1H333K	CAP,C .033UF-K-50V
C2461	ECA1HM4R7B	CAP,E 4.7UF-50V
C2462	ECA1HM4R7B	CAP,E 4.7UF-50V
C2463	ECEA1CN100UB	CAP,E 10UF-16V
C2464	TCJ2VB1H333K	CAP,C .033UF-K-50V
C2465	TCJ2VB1H333K	CAP,C .033UF-K-50V
C2468	ECA1AM101B	CAP,E 100UF-10V
C2473	ECA1HM4R7B	CAP,E 4.7UF-50V
C2474	ECA1AM101B	CAP,E 100UF-10V
C2475	ECA1HM4R7B	CAP,E 4.7UF-50V
C3001	TCJ2VF1H103Z	CAP,C .01UF-Z-50V
C3002	ECA1AM101B	CAP,E 100UF-10V
C3003	ECA1CM100B	CAP,E 10UF-16V
C3004	ECA1HM010B	CAP,E 1UF-50V
C3006	ECA1HM010B	CAP,E 1UF-50V
C3007	ECA1CM100B	CAP,E 10UF-16V
C3008	ECA1CM100B	CAP,E 10UF-16V
C3009	ECA1HM010B	CAP,E 1UF-50V
C3010	TCJ2VF1H103Z	CAP,C .01UF-Z-50V
C3011	ECA1HM010B	CAP,E 1UF-50V
C3012	ECA1CM100B	CAP,E 10UF-16V
C3013	ECA1CM100B	CAP,E 10UF-16V
C3014	ECA1HM010B	CAP,E 1UF-50V
C3016	ECA1HM010B	CAP,E 1UF-50V
C3017	ECEA1CKA100B	CAP,E 10UF-16V *CT-27SX31E/CE/UE*
C3018	ECA1CM100B	CAP,E 10UF-16V
C3019	ECA1CM100B	CAP,E 10UF-16V
C3020	ECA1HM010B	CAP,E 1UF-50V
C3021	TCJ2VF1H103Z	CAP,C .01UF-Z-50V
C3022	ECA1HM010B	CAP,E 1UF-50V
C3023	ECA1CM100B	CAP,E 10UF-16V
C3024	ECA1CM100B	CAP,E 10UF-16V
C3025	TCJ2VF1H103Z	CAP,C .01UF-Z-50V
C3026	TCJ2VC1H820J	CAP,C 82PF-J-50V
C3054	ECA1CM471B	CAP,E 470UF-16V *CT-27SX31E/CE/UE*

REF NO.	PART NO.	DESCRIPTION
C4301	ECA0JM331B	CAP,E 330UF-6.3V *CT-27SX31E/CE/UE*
C4304	ECEA1CKA100B	CAP,E 10UF-16V *CT-27SX31E/CE/UE*
C4307	ECEA1CKN100B	CAP,E 10UF-16V *CT-27SX31E/CE/UE*
C4313	TCJ2VB1H561K	CAP,C 560PF-K-50V *CT-27SX31E/CE/UE*
C4314	ECA1HMR47B	CAP,E .47UF-50V *CT-27SX31E/CE/UE*
C4315	TCJ2VB1H152K	CAP,C 1500PF-K-50V *CT-27SX31E/CE/UE*
C4316	ECA0JM331B	CAP,E 330UF-6.3V *CT-27SX31E/CE/UE*
C4317	TCJ2VF1H103Z	CAP,C .01UF-Z-50V *CT-27SX31E/CE/UE*
C4319	TCJ2VC1H391J	CAP,C 390PF-J-50V *CT-27SX31E/CE/UE*
C4320	TCJ2VB1H681K	CAP,C 680PF-K-50V *CT-27SX31E/CE/UE*
C4801	ECA1HM4R7B	CAP,E 4.7UF-50V
C4803	ECQV1H334JL3	CAP,P .33UF-J-50V
C4804	ECQV1H334JL3	CAP,P .33UF-J-50V
C4805	ECA1VM470B	CAP,E 47UF/35V
C4806	ECA1HM4R7B	CAP,E 4.7UF-50V
C4808	ECA1HM330B	CAP,E 33UF-50V
C6501	ECA0JM101B	CAP,E 100UF-6.3V
C6502	TCJ2VF1H103Z	CAP,C .01UF-Z-50V
C6503	TCJ2VF1H104Z	CAP,C .1UF-Z-50V
C6504	ECA1AM470B	CAP,E 47UF-10V
C6505	TCJ2VF1H103Z	CAP,C .01UF-Z-50V
C6506	TCJ2VF1H103Z	CAP,C .01UF-Z-50V
C6507	ECA1HMR47B	CAP,E .47UF-50V
C6508	TCJ2VF1H103Z	CAP,C .01UF-Z-50V
C6509	ECA1CM470B	CAP,E 47UF/16V
C6510	TCJ2VF1H104Z	CAP,C .1UF-Z-50V
C6511	TCJ2VF1H104Z	CAP,C .1UF-Z-50V
C6512	ECA1CM470B	CAP,E 47UF/16V
C6513	TCJ2VF1H103Z	CAP,C .01UF-Z-50V
C6514	TCJ2VF1H103Z	CAP,C .01UF-Z-50V
C6515	TCJ2VF1H104Z	CAP,C .1UF-Z-50V
C6516	ECA1CM470B	CAP,E 47UF/16V
C6517	TCJ2VC1H181J	CAP,C 180PF-J-50V
C6518	TCJ2VF1H103Z	CAP,C .01UF-Z-50V
C6519	TCJ2VF1H103Z	CAP,C .01UF-Z-50V
C6520	ECA1CM470B	CAP,E 47UF/16V
C6525	TCJ2VC1H120J	CAP,C 12PF-J-50V
C6526	TCJ2VC1H270J	CAP,C 27PF-J-50V
C6532	TCJ2VF1H103Z	CAP,C .01UF-Z-50V
C6569	TCJ2VC1H180J	CAP,C 18PF-J-50V
C6570	ECA1HM010B	CAP,E 1UF-50V
C6572	ECEA1CN470UB	CAP,E 47UF-16V
		DIODES

REPLACEMENT PARTS LIST

Model:CT-27SX31E/UE/CE & CT-27SX11E/UE/CE

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
D001	MA165TA5VT	DIODE, SWITCHING
D002	MA165TA5VT	DIODE, SWITCHING
D003	MA4056MTA	DIODE
D006	MA4330HTA	DIODE
D010	MA4100LTA	DIODE
D014	MA165TA5VT	DIODE, SWITCHING
D015	MA700ATA	DIODE
D051	MA4062MTA	DIODE
D052	MA165TA5VT	DIODE, SWITCHING
D240	MA165TA5VT	DIODE, SWITCHING
D354	MA165TA5VT	DIODE, SWITCHING
D355	MA165TA5VT	DIODE, SWITCHING
D356	MA165TA5VT	DIODE, SWITCHING
D360	ERA22-04V3	DIODE, SILICONE
D361	ERA22-04V3	DIODE, SILICONE
D362	ERA22-04V3	DIODE, SILICONE
D363	MA165TA5VT	DIODE, SWITCHING
D375	MA165TA5VT	DIODE, SWITCHING
D451	ERA15-02V3	DIODE
D455	MA165TA5VT	DIODE, SWITCHING
D456	MA165TA5VT	DIODE, SWITCHING
D457	MA165TA5VT	DIODE, SWITCHING
D459	MA165TA5VT	DIODE, SWITCHING
D551	ERD07-15E	DIODE
D552	RU3NLFA1	DIODE
D553	**MA4062LTVTA**	**DIODE, ZENER**
D554	**MA4270MTA**	**DIODE**
D556	MA4360HTA	DIODE, ZENER
D561	MA165TA5VT	DIODE, SWITCHING
D562	D1NL40V70	DIODE
D563	TVSRU2NV1	DIODE, SILICONE
D564	TVSRU2NV1	DIODE, SILICONE
D570	**D1NL40V70**	**DIODE**
D575	MA165TA5VT	DIODE, SWITCHING
D580	**D1NL40V70**	**DIODE**
D753	AU01ZV0	DIODE
D754	MA165TA5VT	DIODE, SWITCHING
D801	**GP15KL-042**	**DIODE**
D802	**GP15KL-042**	**DIODE**
D803	**GP15KL-042**	**DIODE**
D804	**GP15KL-042**	**DIODE**
D806	**TAP120M012**	**THERMISTOR**
D807	**D1NL20UV70**	**DIODE**
D808	**D1NL20UV70**	**DIODE**
D809	MA4036MTA	DIODE
D810	MA4150MTA	DIODE
D811	MA4270MTA	DIODE
D812	D1NL20UV70	DIODE
D813	TMPG10G3	DIODE
D814	TMPG10G3	DIODE

REF NO.	PART NO.	DESCRIPTION
D822	**RU3YX-MV1**	**DIODE, RECTIFIER**
D823	**S3L60P154004**	**DIODE**
D824	**D1NL20UV70**	**DIODE**
D825	MA165TA5VT	DIODE, SWITCHING
D826	MA4180HTA	DIODE
D837	MA4068MTA	DIODE
D838	MA4150MTA	DIODE
D839	MA165TA5VT	DIODE, SWITCHING
D840	**D1NL20UV70**	**DIODE**
D845	MA165TA5VT	DIODE, SWITCHING
D2101	MA3330MTX	DIODE *CT-27SX31E/CE/UE*
D2302	MA165TA5VT	DIODE, SWITCHING
D2303	MA165TA5VT	DIODE, SWITCHING
D3014	03A505017	DIODE
D2318	MA165TA5VT	DIODE, SWITCHING
D3007	MA4110MTA	DIODE, ZENER
D3008	MA4110MTA	DIODE, ZENER
D3023	MA4110MTA	DIODE, ZENER
D3024	MA4110MTA	DIODE, ZENER
D3025	MA4110MTA	DIODE, ZENER
D3026	MA4110MTA	DIODE, ZENER
D3027	MA4110MTA	DIODE, ZENER
D3028	MA4110MTA	DIODE, ZENER
D3029	MA4110MTA	DIODE, ZENER
D3030	MA4110MTA	DIODE, ZENER
D3051	MA4110MTA	DIODE, ZENER *CT-27SX31E/CE/UE*
D4301	MA3036HTX	DIODE *CT-27SX31E/CE/UE*
		FUSES
F801	**XBA2A00101**	**FUSE 6.3A 125V**
		INTEGRATED CIRCUITS
IC001	**MN101C46FTF1**	**MPU**
IC002	TVR2AJ100	EEPROM
IC003	PIC-37042SR	REMOTE SENSOR
IC005	PQ1R33	STANDBY REG.
IC006	PST9128NR	RESET
IC101	**TA1310BN**	**VCJ**
IC351	TDA6103Q-N3	RGB OUT AMP.
IC451	LA78045	VERTICAL OUT
IC551	AN78M09LB	9V REG.
IC552	AN7805LB	5V REG.
IC750	NJM4565L	HORIZONTAL
IC801	**PC123FY2**	**OPTHO COUPLER**
IC802	**PC123FY2**	**OPTHO COUPLER**
IC820	**UPC1093J-T**	**ZENER REG.**
IC1801	M65617SP	PIP *CT-27SX31E/CE/UE*
IC2101	AN5170K	2ND. RF DECODER *CT-27SX31E/CE/UE*
IC2201	AN5849S-E1V	MTS
IC2301	AN5277	AUDIO OUT AMP.

REPLACEMENT PARTS LIST

Model:CT-27SX31E/UE/CE & CT-27SX11E/UE/CE

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REF NO.	PART NO.	DESCRIPTION
IC2331	NJM4565L	VAO AMP.
IC2451	BH3868CFS-E2	SOUND PROCESSOR
IC3001	M52790SP	A/V SWITCH
IC3002	MM1502XNRE	PIP SW *CT-27SX31E/CE/UE*
IC4801	PUB4301	AMP.
IC4802	AN6564	AMP.
IC6501	TC90A49P	3L COMB FILTER
		COILS
J27	EXCELDR25C	FERRITE BEAD
J146	EXCELSA35T	FERRITE BEAD
J157	EXCELSA39V	FERRITE BEAD
J159	TLTABT470K	COIL, PEAKING 47UH
L002	ELESN180JA	COIL, PEAKING 18UH
L003	TLTABT2R2K	COIL, PEAKING 2.2UH
L004	TLTABT2R2K	COIL, PEAKING 2.2UH
L005	ELESN330JA	COIL, PEAKING 33UH
L006	EXCELSA35V	FERRITE BEAD
L010	TLTABT2R2K	COIL, PEAKING 2.2UH
L011	TLTABT2R2K	COIL, PEAKING 2.2UH
L012	TLTABT2R2K	COIL, PEAKING 2.2UH
L013	TLTABT2R2K	COIL, PEAKING 2.2UH
L100	TLTABT2R2K	COIL, PEAKING 2.2UH
L157	TLTABT101K	COIL
L301	TLTABT470K	COIL, PEAKING 47UH
L302	ELESN120JA	COIL, PEAKING 12UH
L319	TLTABT101K	COIL, PEAKING
L519	ELESN101JA	COIL, PEAKING 100UH
L551	**ELH5L6120**	**COIL**
L553	EXCELSA39V	FERRITE BEAD
L556	ELC18B801E	COIL
L559	TLUADNB682K	COIL
L601	TLUABTA560K	COIL, PEAKING 56UH
L706	EXCELSA35T	FERRITE BEAD
L751	ELC18B801E	COIL
L752	TALL13N103JB	COIL
L801	**ELF20N020A**	**COIL, 2UH**
L802	**G0C681Z00001**	**COIL**
L803	EXCELSA26T	FERRITE BEAD
L805	TALL08T220KA	TRANSFORMER, LINE FILTER
L807	EXCELSA39V	FERRITE BEAD
L808	**ELF20N020A**	**COIL, 2UH**
L809	EXCELSA39V	FERRITE BEAD
L951	EXCELSA24T	FERRITE BEAD
L953	EXCELSA24T	FERRITE BEAD
L954	EXCELSA24T	FERRITE BEAD
L955	EXCELSA24T	FERRITE BEAD
L1801	ELESN1R5KA	COIL, PEAKING 1.5UH *CT-27SX31E/CE/UE*
L1803	ELESN2R2KA	COIL, PEAKING 2.2UH *CT-27SX31E/CE/UE*

REF NO.	PART NO.	DESCRIPTION
L1804	ELESN150JA	COIL, PEAKING 15UH *CT-27SX31E/CE/UE*
L1806	ELESN1R0KA	COIL, PEAKING 1.0UH *CT-27SX31E/CE/UE*
L1807	ELESN1R0KA	COIL, PEAKING 1.0UH *CT-27SX31E/CE/UE*
L1808	EXCELDR25V	FERRITE BEAD *CT-27SX31E/CE/UE*
L2103	ELESN150KA	COIL, PEAKING 15UH *CT-27SX31E/CE/UE*
L2106	ELESN560KA	COIL, PEAKING 56UH *CT-27SX31E/CE/UE*
L2109	EIV7EN053B	COIL, VCO *CT-27SX31E/CE/UE*
L4301	ELESN3R9KA	COIL, PEAKING 3.9UH *CT-27SX31E/CE/UE*
L6503	ELESN330JA	COIL, PEAKING 33UH
L6504	EXCELSA35V	FERRITE BEAD
L6505	EXCELSA35V	FERRITE BEAD
L6507	ELESN150JA	COIL, PEAKING 15UH
L6509	EXCELSA35V	FERRITE BEAD
		TRANSISTORS
Q001	2SC1685QRSTA	TRANSISTOR
Q002	2SC1685QRSTA	TRANSISTOR
Q003	2SD601ARTX	TRANSISTOR
Q004	2SC1685QRSTA	TRANSISTOR
Q005	2SD601ARTX	TRANSISTOR
Q006	2SD601ARTX	TRANSISTOR
Q007	2SC1685QRSTA	TRANSISTOR
Q014	2SD601ARTX	TRANSISTOR *CT-27SX31E/CE/UE*
Q201	2SD601ARTX	TRANSISTOR
Q302	2SB709ARTX	TRANSISTOR *CT-27SX31E/CE/UE*
Q303	2SD601ARTX	TRANSISTOR
Q369	2SA1309ATA	TRANSISTOR
Q402	2SD601ARTX	TRANSISTOR
Q453	2SD601ARTX	TRANSISTOR
Q480	2SA1309ATA	TRANSISTOR
Q501	2SC3941HTA	TRANSISTOR
Q515	2SD601ARTX	TRANSISTOR
Q551	**2SC5339LBMA1**	**TRANSISTOR**
Q603	2SD601ARTX	TRANSISTOR
Q611	2SB709ARTX	TRANSISTOR
Q701	2SD601ARTX	TRANSISTOR
Q751	2SK2146LB	TRANSISTOR
Q754	2SD601ARTX	TRANSISTOR
Q801	**B1DEGQ000013**	**TRANSISTOR**
Q803	2SC1318STA	TRANSISTOR
Q804	2SC1318STA	TRANSISTOR
Q805	2SC1318STA	TRANSISTOR
Q821	2SC3311ASTA	TRANSISTOR
Q822	2SC3311ASTA	TRANSISTOR

REPLACEMENT PARTS LIST

Model:CT-27SX31E/UE/CE & CT-27SX11E/UE/CE

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REF NO.	PART NO.	DESCRIPTION
Q861	2SB1011QRL	TRANSISTOR
Q862	2SC1473ATA	TRANSISTOR
Q901	2SD601ARTX	TRANSISTOR
Q951	2SC3311ATA	TRANSISTOR
Q952	2SC3311ATA	TRANSISTOR
Q953	2SC1741ASTP	TRANSISTOR
Q954	2SB1030ATA	TRANSISTOR
Q955	2SB1569AF51E	TRANSISTOR
Q956	2SD2400AF51E	TRANSISTOR
Q957	2SA1309ATA	TRANSISTOR
Q958	2SC3311ATA	TRANSISTOR
Q961	2SC3311ATA	TRANSISTOR
Q962	2SC3311ATA	TRANSISTOR
Q1801	2SD601ARTX	TRANSISTOR *CT-27SX31E/CE/UE*
Q1802	2SD601ARTX	TRANSISTOR *CT-27SX31E/CE/UE*
Q1803	2SD601ARTX	TRANSISTOR *CT-27SX31E/CE/UE*
Q1804	2SB709ARTX	TRANSISTOR *CT-27SX31E/CE/UE*
Q1805	2SB709ARTX	TRANSISTOR *CT-27SX31E/CE/UE*
Q2101	2SD601ARTX	TRANSISTOR *CT-27SX31E/CE/UE*
Q2301	2SD601ARTX	TRANSISTOR
Q2302	2SD601ARTX	TRANSISTOR
Q2303	2SD601ARTX	TRANSISTOR
Q2331	2SD601ARTX	TRANSISTOR
Q2332	2SB709ARTX	TRANSISTOR
Q2333	2SD601ARTX	TRANSISTOR
Q2334	2SD601ARTX	TRANSISTOR
Q2335	2SB709ARTX	TRANSISTOR
Q2336	2SD601ARTX	TRANSISTOR
Q3050	2SD601ARTX	TRANSISTOR *CT-27SX31E/CE/UE*
Q4309	2SB709ARTX	TRANSISTOR *CT-27SX31E/CE/UE*
Q4310	2SD601ARTX	TRANSISTOR *CT-27SX31E/CE/UE*
Q4311	2SB709ARTX	TRANSISTOR *CT-27SX31E/CE/UE*
Q4312	2SD601ARTX	TRANSISTOR *CT-27SX31E/CE/UE*
Q4313	2SD601ARTX	TRANSISTOR *CT-27SX31E/CE/UE*
Q4315	2SC1384QR	TRANSISTOR *CT-27SX31E/CE/UE*
Q6501	2SD601ARTX	TRANSISTOR
Q6502	2SB709ARTX	TRANSISTOR
Q6506	2SC601ARTX	TRANSISTOR
Q6510	2SD601ARTX	TRANSISTOR
Q6511	2SD601ARTX	TRANSISTOR
Q6512	2SD601ARTX	TRANSISTOR
Q6519	2SD601ARTX	TRANSISTOR
		RELAYS
RL801	**TSEH0005**	**RELAY**
RL802	**TSEH0005**	**RELAY**
		RESISTORS
R001	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R002	ERJ6GEYJ182V	RES,M 1.8K-J-1/10W
R004	ERDS1TJ122T	RES,C 1.2K-J-1/2W
R005	ERDS2TJ470T	RES,C 47-J-1/4W
R006	ERJ6ENF1372V	RES,M 13.7K-F-1/10W
R007	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R009	ERJ6GEYJ221V	RES,M 220-J-1/10W
R010	ERJ6GEYJ223V	RES,M 22K-J-1/10W
R011	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R012	ERJ6GEYJ223V	RES,M 22K-J-1/10W
R013	ERJ6ENF1002V	RES,M 10K-F-1/10W
R014	ERJ6GEYJ392V	RES,M 3.9K-J-1/10W
R015	ERJ6GEYJ472V	RES,M 4.7K-J-1/10W
R016	ERJ6GEYJ472V	RES,M 4.7K-J-1/10W
R017	ERJ6GEYJ472V	RES,M 4.7K-J-1/10W
R020	ERJ6GEYJ682V	RES,M 6.8K-J-1/10W
R021	ERJ6GEYJ101V	RES,M 100-J-1/10W
R022	ERJ6GEYJ101V	RES,M 100-J-1/10W
R023	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R024	ERJ6ENF2322V	RES,M 23.2K-F-1/10W
R025	ERJ6GEYJ223V	RES,M 22K-J-1/10W
R026	ERJ6GEYJ223V	RES,M 22K-J-1/10W *CT-27SX31E/CE/UE*
R026	ERJ6GEYJ473V	RES,M 47K-J-1/10W *CT-27SX31E/CE/UE*
R027	ERJ6GEYJ103V	RES,M 10K-J-1/10W *CT-27SX31E/CE/UE*
R027	ERJ6GEYJ183V	RES,M 18K-J-1/10W *CT-27SX31E/CE/UE*
R028	ERJ6GEYJ562V	RES,M 5.6K-J-1/10W *CT-27SX31E/CE/UE*
R029	ERJ6GEYJ103V	RES,M 10K-J-1/10W *CT-27SX31E/CE/UE*
R030	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R032	ERJ6ENF1002V	RES,M 10K-F-1/10W
R033	ERJ6GEYJ272V	RES,M 2.7K-J-1/10W
R034	ERJ6GEYJ222V	RES,M 2.2K-J-1/10W
R035	ERJ6GEYJ362V	RES,M 3.6K-J-1/10W
R036	ERJ6GEYJ562V	RES,M 5.6K-J-1/10W
R037	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R038	ERJ6GEYJ223V	RES,M 22K-J-1/10W
R039	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R040	ERJ6GEYJ472V	RES,M 4.7K-J-1/10W
R041	ERJ6GEYJ472V	RES,M 4.7K-J-1/10W
R042	ERJ6GEYJ102V	RES,M 1K-J-1/10W

REPLACEMENT PARTS LIST

Model:CT-27SX31E/UE/CE & CT-27SX11E/UE/CE

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REF NO.	PART NO.	DESCRIPTION
R043	ERJ6GEYJ223V	RES,M 22K-J-1/10W *CT-27SX31E/CE/UE*
R044	ERJ6GEYJ273V	RES,M 27K-J-1/10W
R045	ERJ6GEYJ223V	RES,M 22K-J-1/10W
R046	ERJ6GEYJ333V	RES,M 33K-J-1/10W
R047	ERJ6GEYJ562V	RES,M 5.6K-J-1/10W
R048	ERJ6GEYJ333V	RES,M 33K-J-1/10W
R049	ERJ6GEYJ101V	RES,M 100-J-1/10W
R050	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R051	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R052	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R053	ERJ6GEYJ123V	RES,M 12K-J-1/10W
R054	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R057	ERDS2TJ472T	RES,C 4.7K-J-1/4
R059	ERJ6GEYJ223V	RES,M 22K-J-1/10W *CT-27SX31E/CE/UE*
R060	ERJ6GEYJ471V	RES,M 470-J-1/10W
R061	ERJ6GEYJ471V	RES,M 470-J-1/10W
R062	ERDS2TJ101T	RES,C 100-J-1/4W
R066	ERJ6GEYJ752V	RES,M 7.5K-J-1/10W
R067	ERJ6GEYJ752V	RES,M 7.5K-J-1/10W
R068	ERJ6GEYJ752V	RES,M 7.5K-J-1/10W
R072	ERJ6GEYJ562V	RES,M 5.6K-J-1/10W
R073	ERJ6GEYJ562V	RES,M 5.6K-J-1/10W
R074	ERJ6GEYJ562V	RES,M 5.6K-J-1/10W
R075	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R076	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R077	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R078	ERJ6GEYJ101V	RES,M 100-J-1/10W
R079	ERJ6GEYJ101V	RES,M 100-J-1/10W
R081	ERJ6GEYJ220V	RES,M 22-J-1/10W *CT-27SX31E/CE/UE*
R122	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R123	ERJ5GEYJ562V	RES,M 5600-J-1/10W
R201	ERJ6GEYJ331V	RES,M 330-J-1/10W
R223	ERJ6GEYJ561V	RES,M 560-J-1/10W
R225	ERJ6GEYJ331V	RES,M 330-J-1/10W
R226	ERJ6GEYJ331V	RES,M 330-J-1/10W
R245	ERJ6GEYJ224V	RES,M 220K-J-1/10W
R246	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R301	ERJ6GEYJ101V	RES,M 100-J-1/10W
R302	ERJ6GEYJ101V	RES,M 100-J-1/10W
R303	ERJ6GEYJ101V	RES,M 100-J-1/10W
R305	ERJ6GEYJ103V	RES,M 10K-J-1/10W *CT-27SX31E/CE/UE*
R306	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R309	ERJ6GEYJ332V	RES,M 3.3K-J-1/10W *CT-27SX31E/CE/UE*
R310	ERJ6GEYJ332V	RES,M 3.3K-J-1/10W
R328	ERJ6GEYJ105V	RES,M 1M-J-1/10W
R329	ERJ6GEYJ304V	RES,M 300K-J-1/10W
R341	ERJ6GEYJ474V	RES,M 470K-J-1/10W

REF NO.	PART NO.	DESCRIPTION
R351	ER0S2TKF9100	RES,M 910-F-1/4W
R352	ER0S2TKF9100	RES,M 910-F-1/4W
R353	ER0S2TKF9100	RES,M 910-F-1/4W
R354	ERDS2TJ621T	RES,C 620-J-1/4W
R355	ERDS2TJ621T	RES,C 620-J-1/4W
R356	ERDS2TJ621T	RES,C 620-J-1/4W
R357	ERDS2TJ102T	RES,C 1K-J-1/4W
R358	ERDS1TJ134T	RES,C 130K-J-1/2W
R359	ERDS1TJ134T	RES,C 130K-J-1/2W
R360	ERDS1TJ134T	RES,C 130K-J-1/2W
R361	ER0S2TKF8451	RES,M 8.45K-F-1/4W
R362	ER0S2TKF2001	RES,M 2K-F-1/4W
R363	ERC12GK102D	RES,C 1K-K-1/2W
R364	ERC12GK102D	RES,C 1K-K-1/2W
R365	ERC12GK102D	RES,C 1K-K-1/2W
R369	ERDS2TJ393T	RES,C 39K-J-1/4W
R371	ERDS2TJ102T	RES,C 1K-J-1/4W
R372	ERDS2TJ102T	RES,C 1K-J-1/4W
R374	ERQ12AJ121P	RES,F 120-J-1/2W
R375	ERDS2TJ222T	RES,C 2.2K-J-1/4W
R401	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R402	ERJ6GEYJ471V	RES,M 470-J-1/10W
R403	ERJ6GEYJ622V	RES,M 6.2K-J-1/10W
R404	ERJ6GEYJ101V	RES,M 100-J-1/10W
R405	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R410	ERJ6ENF2492V	RES,M 24.9K-F-1/10W
R412	ERJ6ENF6202V	RES,M 62K-F-1/10W
R450	ERJ6GEYJ821V	RES,M 820-J-1/10W
R451	ERG2FJ221H	RES,M 220-J-2W
R452	ERDS1FJ6R8T	RES,C 6.8-J-1/2W
R453	ER0S2TKF1202	RES,M 12K-F-1/4W
R454	ERDS2TJ182T	RES,C 1.8K-J-1/4W
R455	ERDS2TJ512T	RES,C 5.1K-J-1/4W
R456	ERDS2TJ182T	RES,C 1.8K-J-1/4W
R457	ERDS2TJ112T	RES,C 1.1K-J-1/4W
R458	ERJ6GEYJ562V	RES,M 5.6K-J-1/10W
R459	ERX1SJ1R2P	RES,M 1.2-J-1W
R460	ER0S2TKF1002	RES,M 10K-F-1/4
R461	ER0S2TKF1501	RES,M 1.5K-F-1/4W
R465	ERJ6GEYJ104V	RES,M 100K-J-1/10W
R468	ERJ6GEYJ104V	RES,M 100K-J-1/10W
R469	ERJ6GEYJ101V	RES,M 100-J-1/10W
R470	ERJ6GEYJ562V	RES,M 5.6K-J-1/10W
R471	ERJ6GEYJ224V	RES,M 220K-J-1/10W
R472	ERJ6GEYJ123V	RES,M 12K-J-1/10W
R476	ERJ6GEYJ272V	RES,M 2.7K-J-1/10W
R480	ERDS2TJ392T	RES,C 3.9K-J-1/4W
R481	ERDS1FJ1R0T	RES,C 1.0-J-1/2W
R482	ERDS1FJ1R0T	RES,C 1.0-J-1/2W
R485	ERJ6GEYJ152V	RES,M 1.5K-J-1/10W

REPLACEMENT PARTS LIST

Model:CT-27SX31E/UE/CE & CT-27SX11E/UE/CE

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
R486	ERJ6GEYJ473V	RES,M 47K-J-1/10W
R487	ERJ6GEYJ822V	RES,M 8.2K-J-1/10W
R489	ER0S2TKF1202	RES,M 12K-F-1/4W
R490	ER0S2TKF5101	RES,M 5.1K-F-1/4W
R491	ER0S2TKF1052	RES,M 10.5K-F-1/4W
R504	ERJ6GEYJ333V	RES,M 33K-J-1/10W
R505	ERDS1TJ561T	RES,C 560-J-1/2W
R510	ERG2FJ332H	RES,M 3.30K-J-2W
R512	ERG3FJ152H	RES,M 1500-J-3W
R513	ERG3FJ152H	RES,M 1500-J-3W
R515	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R516	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R517	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R524	ERG1FJS122D	RES,M 1200-J-1W
R542	ERJ6GEYJ272V	RES,M 2.7K-J-1/10W
R547	**ERQ1CJPR82S**	**RES,F .82-J-1W**
R550	ERJ6GEYJ682V	RES,M 6.8K-J-1/10W
R553	ERG3FJ680H	RES,M 68-J-3W
R554	ERG3FJ680H	RES,M 68-J-3W
R556	ERDS1FJ1R0T	RES,C 1.0-J-1/2W
R557	ERF10ZK2R7	RES,W 2.7-K-10W
R559	ERG2FJ683H	RES,M 12K-J-2W
R560	ERDS1FJ1R0T	RES,C 1.0-J-1/2W
R561	ERDS2TJ103T	RES,C 10K-J-1/4W
R562	ERDS2TJ272T	RES,C 2.7K-J-1/4W
R565	**ERDS1FJ1R0T**	**RES,C 1.0-J-1/2W**
R567	**ERDS1FJ1R0T**	**RES,C 1.0-J-1/2W**
R569	ERG2FJ683H	RES,M 12K-J-2W *CT-27SX31E/CE/UE*
R571	**ERDS1FJ1R0T**	**RES,C 1.0-J-1/2W**
R576	ERQ12AJ101P	RES,F 100-J-1/2W
R580	**ERD25FJ4R7P**	**RES,C 4.7-J-1/4W**
R581	**ERJ6ENF1692V**	**RES,M 16.9K-F-1/10W**
R582	**ERJ6ENF4992V**	**RES,M 49.9K-F-1/10W**
R590	ERDS2TJ473T	RES,C 47K-J-1/4W
R597	ER0S2TKF2202	RES,M 22K-F-1/4W
R601	ERJ6GEYJ391V	RES,M 390-J-1/10W
R606	ERJ6GEYJ222V	RES,M 2.2K-J-1/10W
R613	ERJ6GEYJ471V	RES,M 470-J-1/10W
R614	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R618	ERJ6GEYJ474V	RES,M 470K-J-1/10W
R619	ERJ6GEYJ563V	RES,M 56K-J-1/10W
R620	ERJ6GEYJ333V	RES,M 33K-J-1/10W
R701	ERJ6GEYJ562V	RES,M 5.6K-J-1/10W
R702	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R704	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R705	ERJ6GEYJ332V	RES,M 3.3K-J-1/10W
R706	ERJ6GEYJ161V	RES,M 160-J-1/10W
R707	ERJ6GEYJ561V	RES,M 560-J-1/10W
R708	ERJ6GEYJ101V	RES,M 100-J-1/10W
R709	ERJ6GEYJ103V	RES,M 10K-J-1/10W

REF NO.	PART NO.	DESCRIPTION
R710	ERJ6GEYJ562V	RES,M 5.6K-J-1/10W
R711	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R712	ERJ6GEYJ222V	RES,M 2.2K-J-1/10W
R713	ERJ6GEYJ822V	RES,M 8.2K-J-1/10W
R714	ERDS1FJ102T	RES,C 1K-J-1/2W
R716	ERJ6GEYJ101V	RES,M 100-J-1/10W
R717	ERJ6GEYJ101V	RES,M 100-J-1/10W
R719	ERJ6GEYJ225V	RES,M 2.2M-J-1/10W
R720	ERJ6GEYJ274V	RES,M 270K-J-1/10W
R752	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R753	ERDS1FJ102T	RES,C 1K-J-1/2W
R754	ERDS1TJ751T	RES,C 750-J-1/2W
R756	ERG2FJ820H	RES,M 82-J-2W
R757	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R801	**ERF7ZK1R5**	**RES,W 1.5-K-7W**
R804	ERDS2TJ182T	RES,C 1.8K-J-1/4W
R805	**ERG2FJ331H**	**RES,M 330-J-2W**
R806	ERDS2TJ473T	RES,C 47K-J-1/4W
R807	ERD50FJ474P	RES,C 470K-J-1/2W
R808	ERD50FJ474P	RES,C 470K-J-1/2W
R809	ERDS2TJ561T	RES,C 560-J-1/4W
R811	ER0S2TKF2611	RES
R812	ERDS2TJ331T	RES,C 330-J-1/4W
R813	ERDS2TJ223T	RES,C 22K-J-1/4W
R814		
R815	**ERC12ZGM825D**	**RES,S 8.2MEG-M-1/2**
R820	ERJ6GEYJ273V	RES,M 27K-J-1/10W
R821	ERJ6GEYJ272V	RES,M 2.7K-J-1/10W
R822	ERDS1FJ102T	RES,C 1K-J-1/2W
R823	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R826	ERDS2TJ104T	RES,C 100K-J-1/4W
R827	ERDS2TJ183T	RES,C 18K-J-1/4W
R828	ERDS2TJ104T	RES,C 100K-J-1/4W
R829	ERX12SJR47P	RES,M .47-J-1/2W
R830	ERDS2TJ103T	RES,C 10K-J-1/4
R832	ERDS2TJ104T	RES,C 100K-J-1/4W
R833	ERDS2TJ474T	RES,C 470K-J-1/4W
R836	ERDS2TJ222T	RES,C 2.2K-J-1/4W
R837	ERDS2TJ102T	RES,C 1K-J-1/4W
R838	ER0S2TKF2201	RES,M 2.2K-F-1/4W
R839	ER0S2TKF1003	RES,M 100K-F-1/4
R843	ERDS2TJ271T	RES,C 270-J-1/4W
R844	ERDS2TJ222T	RES,C 2.2K-J-1/4W
R845	ERDS2TJ334T	RES,C 330K-J-1/4W
R849	ER0S2TKF2002	RES,M 20K-F-1/4W
R850	**ERQ12HJR56P**	**RES,F .56-J-1/2W**
R851	ERX12SJR47P	RES,M .47-J-1/2W
R853	ERX12SZJR12P	RES,M .12-J-1/2W
R854	ERX12SJR22P	RES,M .22-J-1/2W
R855	ERDS2TJ473T	RES,C 47K-J-1/4W

REPLACEMENT PARTS LIST

Model:CT-27SX31E/UE/CE & CT-27SX11E/UE/CE

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
R856	ERQ3CJ3R9	RES,F 3.9-J-3W
R857	ERJ6GEYJ223V	RES,M 22K-J-1/10W
R858	ERJ6GEYJ272V	RES,M 2.7K-J-1/10W
R861	ERDS2TJ103T	RES,C 10K-J-1/4
R862	ERDS2TJ104T	RES,C 100K-J-1/4W
R863	ERJ6GEYJ393V	RES,M 39K-J-1/10W
R864	ERDS2TJ104T	RES,C 100K-J-1/4W
R901	ERJ6GEYJ473V	RES,M 47K-J-1/10W
R902	ERJ6GEYJ473V	RES,M 47K-J-1/10W
R903	ERJ6GEYJ561V	RES,M 560-J-1/10W
R904	ERJ6GEYJ152V	RES,M 1.5K-J-1/10W
R905	ERJ6GEYJ391V	RES,M 390-J-1/10W
R951	ERDS2TJ821T	RES,C 820-J-1/4W
R952	ERDS2TJ153T	RES,C 15K-J-1/4W
R953	ERDS2TJ332T	RES,C 3.3K-J-1/4W
R954	ERDS2TJ431T	RES,C 430-J-1/4W
R956	ERDS2TJ121T	RES,C 120-J-1/4W
R958	ERDS2TJ391T	RES,C 390-J-1/4W
R959	ERDS2TJ101T	RES,C 100-J-1/4W
R960	ERQ14AJ100E	RES,F 10-J-1/4W
R961	ERQ1CJP331S	RES,F 330-J-1W
R962	ERDS2TJ330T	RES,C 33-J-1/4W
R963	ERDS2TJ330T	RES,C 33-J-1/4W
R964	ERDS2TJ471T	RES,C 470-J-1/4W
R965	ERDS2TJ563T	RES,C 56K-J-1/4W
R966	ERDS1FVJ471T	RES,C 470-J-1/4W
R967	ERDS2TJ563T	RES,C 56K-J-1/4W
R968	ERDS2TJ471T	RES,C 470-J-1/4W
R969	ERDS2TJ390T	RES,C 39-J-1/2W
R970	ERDS2TJ2R2T	RES,C 2.2-J-1/4W
R971	ERDS2TJ2R2T	RES,C 2.2-J-1/4W
R972	ERDS2TJ390T	RES,C 39-J-1/2W
R973	ERDS2TJ101T	RES,C 100-J-1/4W
R974	ERDS2TJ333T	RES,C 33K-J-1/4W
R975	ERDS2TJ101T	RES,C 100-J-1/4W
R976	ERDS2TJ101T	RES,C 100-J-1/4W
R977	ERDS2TJ561T	RES,C 560-J-1/4W
R978	ERDS2TJ101T	RES,C 100-J-1/4W
R987	ERDS2TJ472T	RES,C 4.7K-J-1/4
R988	ERDS2TJ331T	RES,C 330-J-1/4W
R989	ERDS2TJ682T	RES,C 6.8K-J-1/4W
R990	ERDS2TJ471T	RES,C 470-J-1/4W
R993	ERDS2TJ471T	RES,C 470-J-1/4W
R1801	ERJ6GEYJ301V	RES,M 300-J-1/10W *CT-27SX31E/CE/UE*
R1802	ERJ6GEYJ104V	RES,M 100K-J-1/10W *CT-27SX31E/CE/UE*
R1803	ERJ6GEYJ474V	RES,M 470K-J-1/10W *CT-27SX31E/CE/UE*
R1804	ERJ6GEYJ202V	RES,M 2K-J-1/10W *CT-27SX31E/CE/UE*
R1805	ERJ6GEYJ102V	RES,M 1K-J-1/10W *CT-27SX31E/CE/UE*
R1807	ERJ6GEYJ103V	RES,M 10K-J-1/10W *CT-27SX31E/CE/UE*
R1808	ERJ6GEYJ103V	RES,M 10K-J-1/10W *CT-27SX31E/CE/UE*
R1809	ERJ6GEYJ473V	RES,M 47K-J-1/10W *CT-27SX31E/CE/UE*
R1810	ERJ6GEYJ103V	RES,M 10K-J-1/10W *CT-27SX31E/CE/UE*
R1811	ERJ6GEYJ682V	RES,M 6.8K-J-1/10W *CT-27SX31E/CE/UE*
R1812	ERJ6GEYJ153V	RES,M 15K-J-1/10W *CT-27SX31E/CE/UE*
R1813	ERJ6GEYJ153V	RES,M 15K-J-1/10W *CT-27SX31E/CE/UE*
R1814	ERJ6GEYJ271V	RES,M 270-J-1/10W *CT-27SX31E/CE/UE*
R1815	ERJ6GEYJ361V	RES,M 360-J-1/10W *CT-27SX31E/CE/UE*
R1818	ERJ6GEYJ101V	RES,M 100-J-1/10W *CT-27SX31E/CE/UE*
R1819	ERJ6GEYJ101V	RES,M 100-J-1/10W *CT-27SX31E/CE/UE*
R1822	ERJ6GEYJ682V	RES,M 6.8K-J-1/10W *CT-27SX31E/CE/UE*
R1823	ERJ6GEYJ473V	RES,M 47K-J-1/10W *CT-27SX31E/CE/UE*
R1825	ERJ6GEYJ471V	RES,M 470-J-1/10W *CT-27SX31E/CE/UE*
R1827	ERJ6GEYJ102V	RES,M 1K-J-1/10W *CT-27SX31E/CE/UE*
R1828	ERJ6GEYJ471V	RES,M 470-J-1/10W *CT-27SX31E/CE/UE*
R1830	ERJ6GEYJ102V	RES,M 1K-J-1/10W *CT-27SX31E/CE/UE*
R1856	ERJ6GEYJ153V	RES,M 15K-J-1/10W *CT-27SX31E/CE/UE*
R2106	ERJ6GEYJ183V	RES,M 18K-J-1/10W *CT-27SX31E/CE/UE*
R2109	ERJ6GEYJ683V	RES,M 68K-J-1/10W *CT-27SX31E/CE/UE*
R2110	ERJ6GEYJ331V	RES,M 330-J-1/10W *CT-27SX31E/CE/UE*
R2111	ERJ6GEYJ152V	RES,M 1.5K-J-1/10W *CT-27SX31E/CE/UE*
R2112	ERJ6GEYJ331V	RES,M 330-J-1/10W *CT-27SX31E/CE/UE*
R2113	ERJ6GEYJ102V	RES,M 1K-J-1/10W *CT-27SX31E/CE/UE*
R2114	ERJ6GEYJ681V	RES,M 680-J-1/10W *CT-27SX31E/CE/UE*
R2116	ERJ6GEYJ102V	RES,M 1K-J-1/10W *CT-27SX31E/CE/UE*
R2117	ERJ6GEYJ121V	RES,M 120-J-1/10W *CT-27SX31E/CE/UE*

REPLACEMENT PARTS LIST

Model:CT-27SX31E/UE/CE & CT-27SX11E/UE/CE

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
R2118	EVND8AA03B14	CONTROL 10K *CT-27SX31E/CE/UE*
R2119	ERJ6GEYJ392V	RES,M 3.9K-J-1/10W *CT-27SX31E/CE/UE*
R2121	ERJ6GEYJ221V	RES,M 220-J-1/10W *CT-27SX31E/CE/UE*
R2122	ERJ6GEYJ473V	RES,M 47K-J-1/10W *CT-27SX31E/CE/UE*
R2123	ERJ6GEYJ473V	RES,M 47K-J-1/10W *CT-27SX31E/CE/UE*
R2124	ERJ6GEYJ332V	RES,M 3.3K-J-1/10W *CT-27SX31E/CE/UE*
R2127	ERJ6GEYJ101V	RES,M 100-J-1/10W *CT-27SX31E/CE/UE*
R2203	ERJ6GEYJ751V	RES,M 750-J-1/10W
R2206	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R2207	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R2221	ERJ6GEYJ273V	RES,M 27K-J-1/10W
R2303	ERJ6GEYJ822V	RES,M 8.2K-J-1/10W
R2304	ERJ6GEYJ822V	RES,M 8.2K-J-1/10W
R2307	ERJ6GEYJ822V	RES,M 8.2K-J-1/10W
R2309	ERJ6GEYJ223V	RES,M 22K-J-1/10W
R2310	ERJ6GEYJ223V	RES,M 22K-J-1/10W
R2311	ERJ6GEYJ271V	RES,M 270-J-1/10W
R2312	ERJ6GEYJ153V	RES,M 15K-J-1/10W
R2313	ERJ6GEYJ153V	RES,M 15K-J-1/10W
R2316	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R2317	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R2318	ERDS1TJ332T	RES,C 3.3K-J-1/2W
R2319	ERDS1TJ332T	RES,C 3.3K-J-1/2W
R2321	ERDS2TJ181T	RES,C 180-J-1/4W
R2322	ERDS2TJ181T	RES,C 180-J-1/4W
R2323	ERJ6GEYJ223V	RES,M 22K-J-1/10W
R2324	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R2325	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R2326	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R2332	ERJ6GEYJ105V	RES,M 1M-J-1/10W
R2333	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R2334	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R2335	ERJ6GEYJ183V	RES,M 18K-J-1/10W
R2336	ERJ6GEYJ392V	RES,M 3.9K-J-1/10W
R2337	ERJ6GEYJ332V	RES,M 3.3K-J-1/10W
R2338	ERJ6GEYJ332V	RES,M 3.3K-J-1/10W
R2339	ERJ6GEYJ183V	RES,M 18K-J-1/10W
R2340	ERJ6GEYJ392V	RES,M 3.9K-J-1/10W
R2345	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R2346	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R2347	ERJ6GEYJ105V	RES,M 1M-J-1/10W
R2349	ERJ6GEYJ472V	RES,M 4.7K-J-1/10W
R2351	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R2352	ERJ6GEYJ562V	RES,M 5.6K-J-1/10W
R2353	ERJ6GEYJ563V	RES,M 56K-J-1/10W

REF NO.	PART NO.	DESCRIPTION
R2354	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R2356	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R2366	ERJ6GEYJ222V	RES,M 2.2K-J-1/10W
R2367	ERJ6GEYJ222V	RES,M 2.2K-J-1/10W
R2431	ERJ6GEYJ105V	RES,M 1M-J-1/10W
R2432	ERJ6GEYJ105V	RES,M 1M-J-1/10W
R2433	ERJ6ENF4701V	RES,M 4.7K-F-1/10W
R2434	ERJ6GEYJ681V	RES,M 680-J-1/10W
R2435	ERJ6ENF3902V	RES,M 39K-F-1/10W
R2436	ERJ6ENF6202V	RES,M 62K-F-1/10W
R2437	ERJ6GEYJ681V	RES,M 680-J-1/10W
R2438	ERJ6GEYJ271V	RES,M 270-J-1/10W
R2439	ERJ6GEYJ271V	RES,M 270-J-1/10W
R3001	ERJ6GEYJ101V	RES,M 100-J-1/10W
R3003	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R3004	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R3005	ERJ6GEYJ330V	RES,M 33-J-1/10W
R3006	ERJ6ENF75R0V	RES,M 75.0-F-1/10W
R3007	ERJ6ENF75R0V	RES,M 75.0-F-1/10W
R3008	ERJ6GEYJ750V	RES,M 75-J-1/10W
R3009	ERJ6ENF75R0V	RES,M 75.0-F-1/10W
R3010	ERJ6ENF75R0V	RES,M 75.0-F-1/10W
R3011	ERJ6ENF75R0V	RES,M 75.0-F-1/10W
R3012	ERJ6ENF75R0V	RES,M 75.0-F-1/10W
R3013	ERJ6GEYJ330V	RES,M 33-J-1/10W
R3014	ERJ6GEYJ330V	RES,M 33-J-1/10W
R3015	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R3016	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R3017	ERJ6GEYJ330V	RES,M 33-J-1/10W
R3018	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R3019	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R3020	ERJ6GEYJ330V	RES,M 33-J-1/10W
R3021	ERJ6GEYJ471V	RES,M 470-J-1/10W *CT-27SX31E/CE/UE*
R3022	ERJ6GEYJ471V	RES,M 470-J-1/10W *CT-27SX31E/CE/UE*
R3024	ERJ6ENF75R0V	RES,M 75.0-F-1/10W
R3025	ERJ6ENF75R0V	RES,M 75.0-F-1/10W
R3060	ERJ6GEYJ471V	RES,M 470-J-1/10W *CT-27SX31E/CE/UE*
R3061	ERJ6GEYJ471V	RES,M 470-J-1/10W *CT-27SX31E/CE/UE*
R3065	ERJ6GEYJ680V	RES,M 68-J-1/10W *CT-27SX31E/CE/UE*
R3069	ERJ6GEYJ471V	RES,M 470-J-1/10W *CT-27SX31E/CE/UE*
R4310	ERJ6GEYJ472V	RES,M 4.7K-J-1/10W *CT-27SX31E/CE/UE*
R4311	ERJ6GEYJ472V	RES,M 4.7K-J-1/10W *CT-27SX31E/CE/UE*
R4326	ERD25VJ221T	RES,C 220-J-1/4 *CT-27SX31E/CE/UE*

REPLACEMENT PARTS LIST

Model:CT-27SX31E/UE/CE & CT-27SX11E/UE/CE

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
R4327	ERJ6GEYJ331V	RES,M 330-J-1/10W *CT-27SX31E/CE/UE*
R4328	ERJ6GEYJ560V	RES,M 56-J-1/10W *CT-27SX31E/CE/UE*
R4329	ERJ6GEYJ182V	RES,M 1.8K-J-1/10W *CT-27SX31E/CE/UE*
R4330	ERJ6GEYJ561V	RES,M 560-J-1/10W *CT-27SX31E/CE/UE*
R4331	ERJ6GEYJ391V	RES,M 390-J-1/10W *CT-27SX31E/CE/UE*
R4332	ERJ6GEYJ393V	RES,M 39K-J-1/10W *CT-27SX31E/CE/UE*
R4333	ERJ6GEYJ304V	RES,M 300K-J-1/10W *CT-27SX31E/CE/UE*
R4334	ERJ6GEYJ152V	RES,M 1.5K-J-1/10W *CT-27SX31E/CE/UE*
R4336	ERJ6GEYJ680V	RES,M 68-J-1/10W *CT-27SX31E/CE/UE*
R4338	ERJ6GEYJ222V	RES,M 2.2K-J-1/10W *CT-27SX31E/CE/UE*
R4339	ERJ6GEYJ102V	RES,M 1K-J-1/10W *CT-27SX31E/CE/UE*
R4340	ERJ6GEYJ682V	RES,M 6.8K-J-1/10W *CT-27SX31E/CE/UE*
R4341	ERJ6GEYJ222V	RES,M 2.2K-J-1/10W *CT-27SX31E/CE/UE*
R4342	ERJ6GEYJ223V	RES,M 22K-J-1/10W *CT-27SX31E/CE/UE*
R4344	ERJ6GEYJ682V	RES,M 6.8K-J-1/10W *CT-27SX31E/CE/UE*
R4345	ERJ6GEYJ103V	RES,M 10K-J-1/10W *CT-27SX31E/CE/UE*
R4801	ERDS2TJ472T	RES,C 4.7K-J-1/4
R4803	ERX12SJ1R0P	RES,M 1.0-J-1/2W
R4804	ER0S2TKF2201	RES,M 2.2K-F-1/4W
R4805	ER0S2TKF2201	RES,M 2.2K-F-1/4W
R4806	ER0S2TKF2201	RES,M 2.2K-F-1/4W
R4807	ER0S2TKF2201	RES,M 2.2K-F-1/4W
R4808	ER0S2TKF3003	RES,M 300K-F-1/4W
R4809	ER0S2TKF1002	RES,M 10K-F-1/4
R4810	ER0S2TKF1502	RES,M 15.0K-F-1/4
R4811	ER0S2TKF1002	RES,M 10K-F-1/4
R4812	ER0S2TKF3301	RES,M 3.3K-F-1/4W
R4815	ERDS1FJ100T	RES,C 10-J-1/2W
R6501	ERJ6GEYJ273V	RES,M 27K-J-1/10W
R6502	ERJ6GEYJ473V	RES,M 47K-J-1/10W
R6503	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R6504	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R6505	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R6506	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R6509	ERJ6GEYJ471V	RES,M 470-J-1/10W
R6510	ERJ6GEYJ471V	RES,M 470-J-1/10W
R6512	ERJ6GEYJ471V	RES,M 470-J-1/10W
R6513	ERJ6GEYJ122V	RES
R6514	ERJ6GEYJ123V	RES,M 12K-J-1/10W
R6516	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R6517	ERJ6GEYJ471V	RES,M 470-J-1/10W
R6520	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R6522	ERJ6GEYJ471V	RES,M 470-J-1/10W
R6524	ERJ6GEYJ471V	RES,M 470-J-1/10W
R6538	ERJ6GEYJ821V	RES,M 820-J-1/10W
R6548	ERJ6GEYJ471V	RES,M 470-J-1/10W
R6565	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R6566	ERJ6GEYJ681V	RES,M 680-J-1/10W
R6567	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R6568	ERJ6GEYJ102V	RES,M 1K-J-1/10W
		SWITCHES
S001	EVQPC105K	SWITCH
S002	EVQPC105K	SWITCH
S003	EVQPC105K	SWITCH
S004	EVQPC105K	SWITCH
S005	EVQPC105K	SWITCH
S006	EVQPC105K	SWITCH
S007	EVQPC105K	SWITCH
		TRANSFORMERS
T501	ETH19Y70AY	TRANSFORMER, HORIZONTAL DRIVER
T551	**KFT4AA390F**	**TRANSFORMER, FLYBACK**
T801	**ETS39AG375NC**	**TRANSFORMER**
		CRISTALS/FILTERS
X001	TSSA092	CRYSTAL OSCILLATOR
X501	TSS2AA001	CRYSTAL, 3.58MHZ
X601	TAFCSB503F30	CRYSTAL
X1801	TSSA092	CRYSTAL OSCILLATOR *CT-27SX31E/CE/UE*
X2102	EFCS4R5MW5BA	FILTER, BANDPASS *CT-27SX31E/CE/UE*
X2103	M1972M	FILTER *CT-27SX31E/CE/UE*
		OTHERS
TNR001	**ENG36604G**	**TUNER** ***CT-27SX11E/CE/UE***
TNR001	**ENG36613G**	**TUNNER** ***CT-27SX31E/CE/UE***
TNR002	**ENV56D61G3**	**TUNNER** ***CT-27SX31E/CE/UE***
M001	**TSX2AA0111-1**	**A/C LINE CORD**
M002	**A68QCP893XU**	**CRT 27**
M003	**TJSC01200**	**CRT SOCKET**
DY	**TLY2AA016**	**DEFLECTION YOKE**
M004	TXF3A01ZERA	ASSY., DAG GND
DEG	**TSP2AA019**	**COIL, DEGAUSSING**
M005	0FMK014ZZ	CONVERGENCE CORRECTOR STRIP
M006	TSP2AF002	COIL, ROTATION
M007	ENPE630	SPLITTER, RF *CT-27SX31E/CE/UE*
M008	TAS2AA0023	SPEAKER 8-OHM
M009	TBM2A30843	BADGE, PANASONIC
M010	TBX2AA0151G	BUTTON, 7-KEY

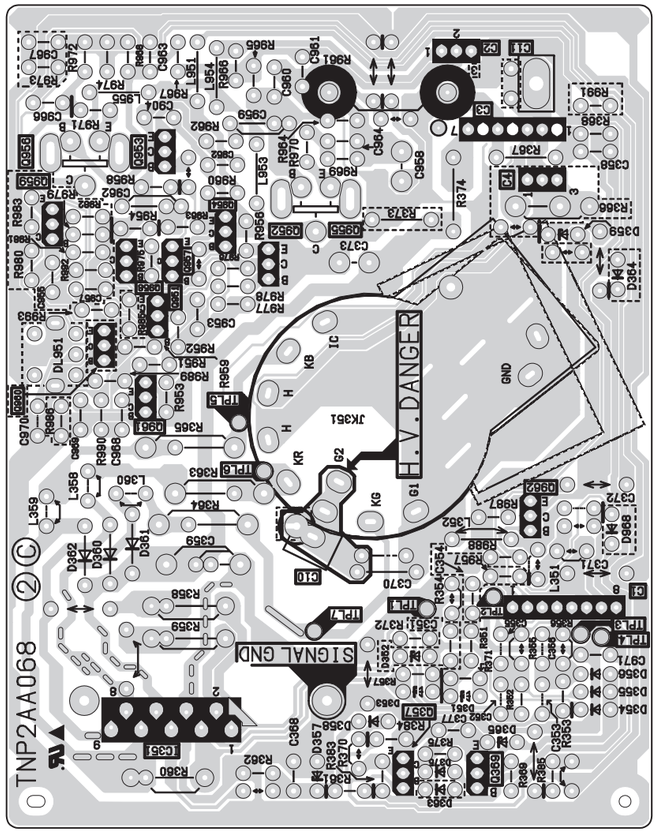
REPLACEMENT PARTS LIST

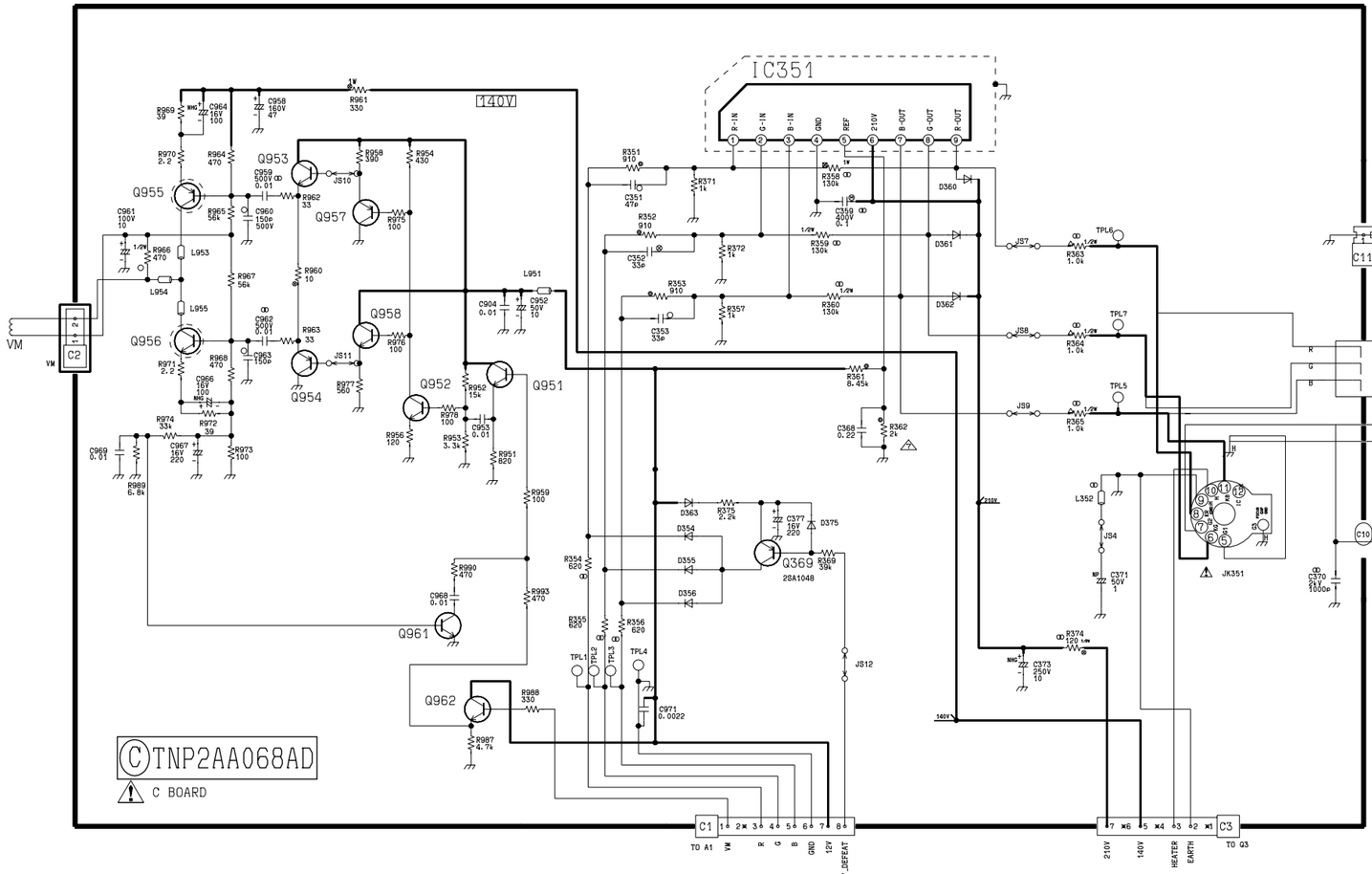
Model:CT-27SX31E/UE/CE & CT-27SX11E/UE/CE

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
M011	TEK6940	DOOR CATCH
M012	TKP2AA0613S	ASSY, CONTROL DOOR
M013	TKX2AA0131	IR GUIDE
M014	TMW2A97121	STRAIN RELIEF: AC LINE CORD
M015	TXFKY31ESER	ASSY, CABINET FRONT
M016	TXFKU22ESER	ASSY, CABINET BACK *CT-27SX11E/CE/UE*
M017	TXFKU23ESER	ASSY, CABINET BACK *CT-27SX31E/CE/UE*
M018	TXFSPB03BSER	ASSY, SPEAKER BRACKET
JK3001	TJB2AA0221	TERMINAL, A/V 8P
JK3002	TJB2AA0171	TERMINAL, S-VHS
JK3003	TJB2AA0371	TERMINAL, FRONT A/V
JK3005	TJB2AA0211-1	TERMINAL, A/V 2P *CT-27SX11E/CE/UE*
JK3005	TJB2AA0341	TERMINAL, REAR A/V 3P *CT-27SX31E/CE/UE*

REF NO.	PART NO.	DESCRIPTION
	ACCESORIES	
M019	UR51EC975A	BATTERY COVER, REMOTE CONTROL
M020	EUR511502	REMOTE CONTROL *CT-27SX11E/CE/UE*
M021	EUR511500	REMOTE CONTROL *CT-27SX31E/CE/UE*
M022	TQB2AA7078-1	V-CHIP NA8
M023	TQB2AA7060	REMOTE GUIDE *CT-27SX31E/CE/UE*
M024	TQB2AA7058	REMOTE GUIDE *CT-27SX11E/CE/UE*
M025	TQB2AA0372	MANUAL, OWNERS *CT-27SX31E/UE & CT-27SX11E/UE*
M026	TQB2AA0402	MANUAL, OWNERS *CT-27SX31CE & CT-27SX11CE*





C-Board Voltages - Voltajes Placa-C

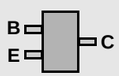
IC351	
1	1.69
2	1.69
3	1.69
4	0.00
5	1.79
6	219.68
7	154.10
8	153.40
9	153.61

	Q369	Q951	Q952	Q953	Q954
B	14.80	2.39	1.10	7.08	6.39
C	0.00	8.80	7.09	8.80	0.00
E	14.59	1.70	0.50	7.10	7.10

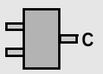
	Q955	Q956	Q957	Q958	Q961
B	140.60	1.00	7.09	7.10	0.00
C	76.20	76.10	0.00	8.80	0.00
E	140.20	0.50	7.20	6.40	0.00

	Q962
B	2.99
C	8.80
E	2.40

IDENTIFICACIÓN DE TERMINALES PARA TRANSISTORES EN *CHIP*



CHIP TRANSISTOR LEAD DESIGNATION



Schematic Notes

1. Resistors are carbon 1/4W unless noted otherwise.
2. Capacitors are ceramic 50V unless noted otherwise.
3. Coil value notes is inductance in µH.
4. Test point indicated by ⏚ Test point but no pin ⏚.
5. Components indicated with ⚠ are critical parts and replacement should be made with manufacture specified replacement parts only.
6. ▬▬ (**BOLD LINE**) indicates the route of B+ supply.
7. The schematic diagrams are current at the time of printing and are subject to change without notice.
8. Ground symbol ⏚ indicates **HOT GROUND CONNECTION**; ⏚ indicates COLD GROUND.

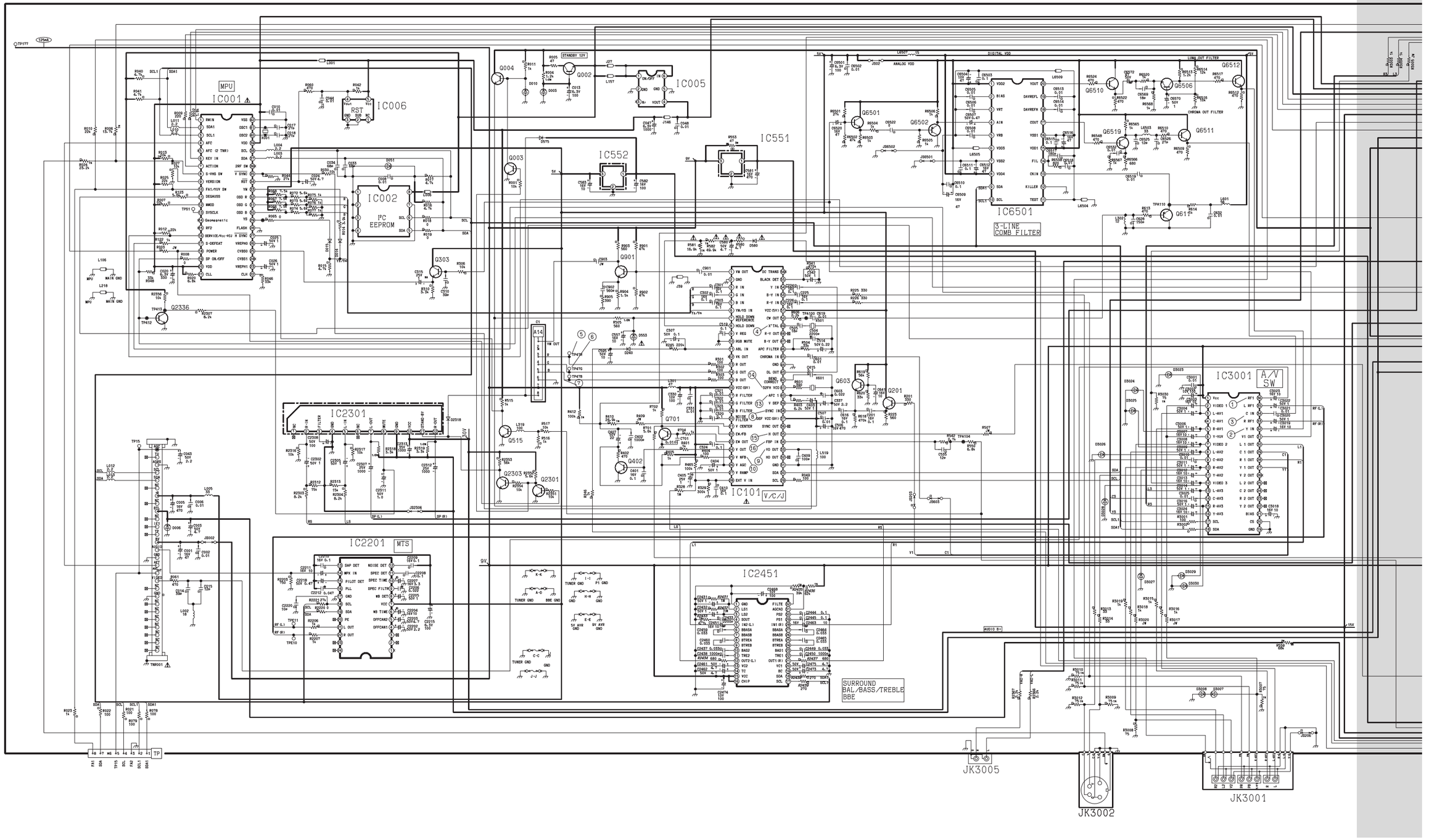
NOTE: All other component symbols are used for engineering design purposes.

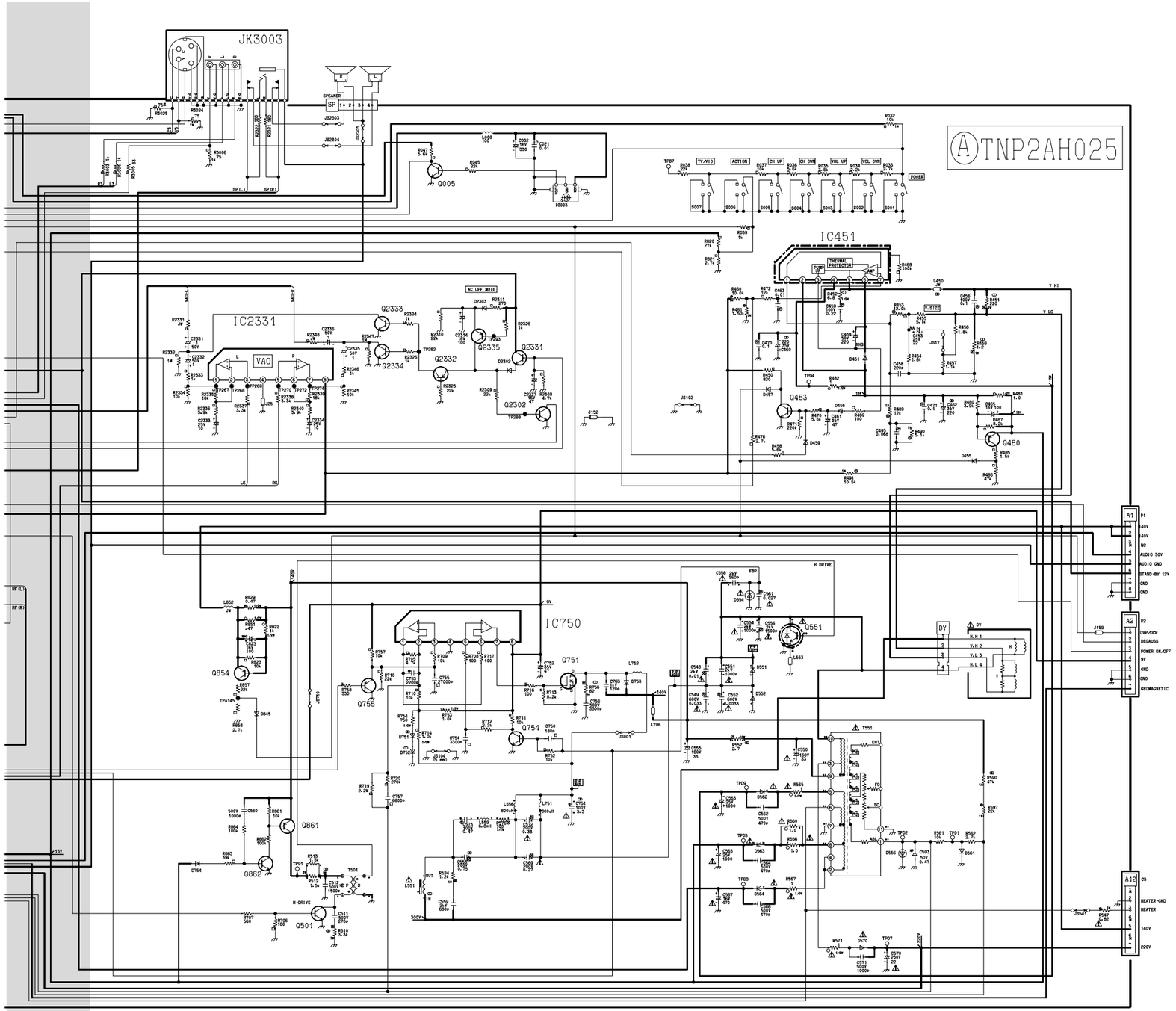
Notas de los Diagramas

1. Las Resistencias son de Carbón de 1/4W, a menos que se indique otra característica.
2. Los Capacitores son de Cerámica para 50V, a menos que se indique otra característica.
3. El valor indicado de las Bobinas es la inductancia expresada en µH.
4. Los puntos de prueba en la terminal de algún componente son indicados por ⏚ Los puntos de prueba fuera de los componentes se indican con ⏚.
5. Los componentes señalados con el símbolo ⚠ son considerados componentes críticos y deben ser reemplazados sólo con las partes especificadas por el fabricante.
6. ▬▬ (**LINEA GRUESA**) indica las líneas de alimentación de los Voltajes B+.
7. Los diagramas eléctricos están sujetos a cambio sin previo aviso.
8. El símbolo ⏚ indica que es una conexión a **Tierra Caliente** y el símbolo ⏚ indica conexión a **Tierra Fría**.

NOTA: Los demas símbolos de componentes incluidos son usados con fines de diseño.

A-Board Schematic, Left Portion - Diagrama Eléctrico de la Tarjeta-A, Sección Izquierda





Medición de Voltajes

1. Medición de voltaje:
   - El voltaje de entrada al Receptor es de 120V de Corriente Alterna. Un generador de patrones con formato NTSC se conecta a la entrada de la antena. (Patrón de Barras de Colores con 100 IREs para el Blanco y 7.5 IREs para el Negro.)
   - Los ajustes de los Menus Picture y Audio se normalizan.
     En el Menú Set-Up, en la opción ANTENA, se selecciona el modo de CABLE.
     El nivel de Volumen se minimiza.
     De los modos TV y Video, seleccionar el modo TV.
     Seleccionar modo Estereo del Audio.
   - Las mediciones de los voltajes son nominales y pueden variar hasta 10% en componentes en funcionamiento. Las lecturas de los voltajes pueden variar por la potencia de la señal y el contenido de la imagen.
   - Las fuentes de voltajes son nominales.
2. El símbolo ⏚ indica el tipo de tierra que se utiliza en la conexión del medidor.

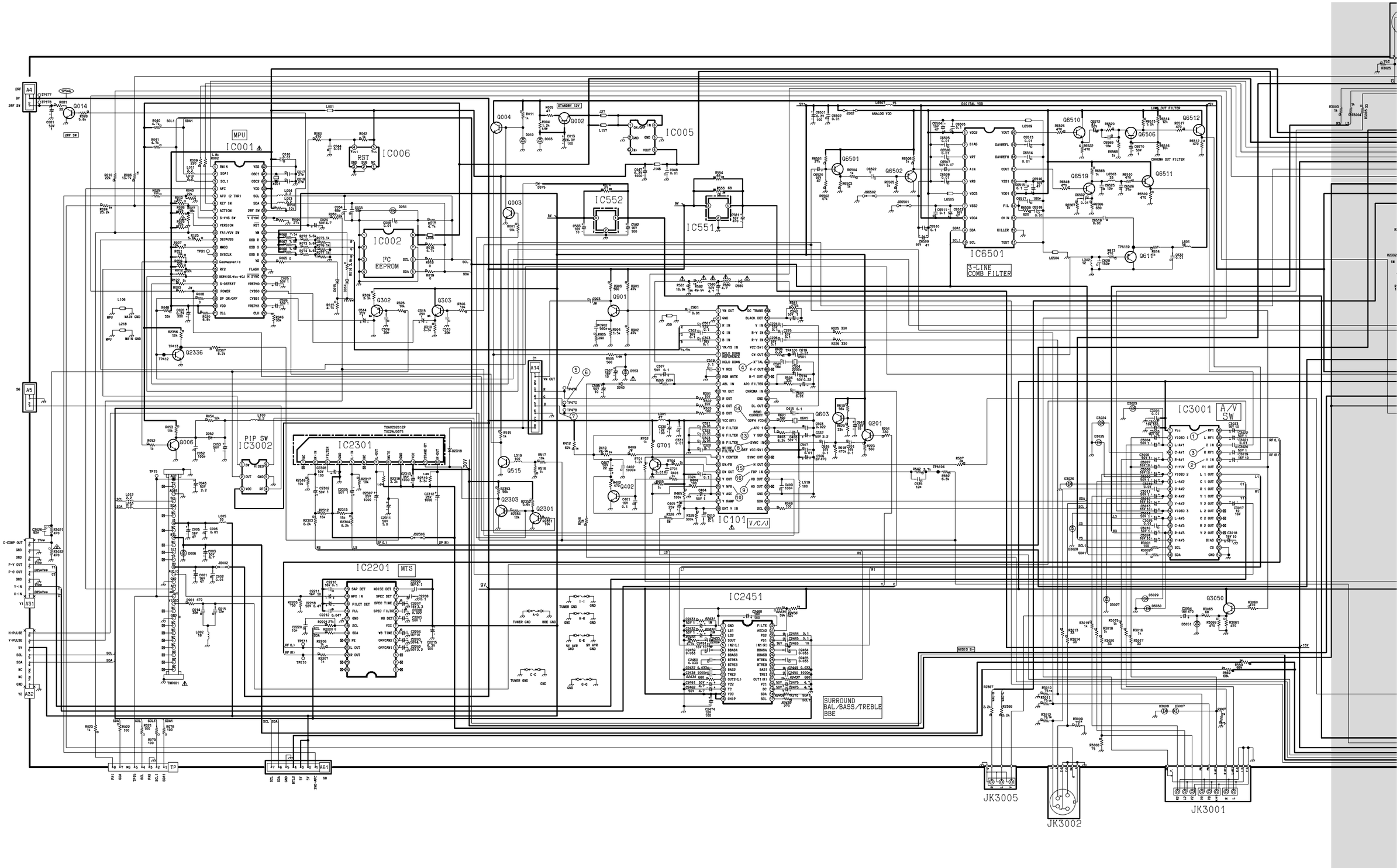
PRECAUCION: Si no se utiliza la conexión a la tierra adecuada, se obtendrán mediciones equivocadas y podría dañar el equipo de medición.

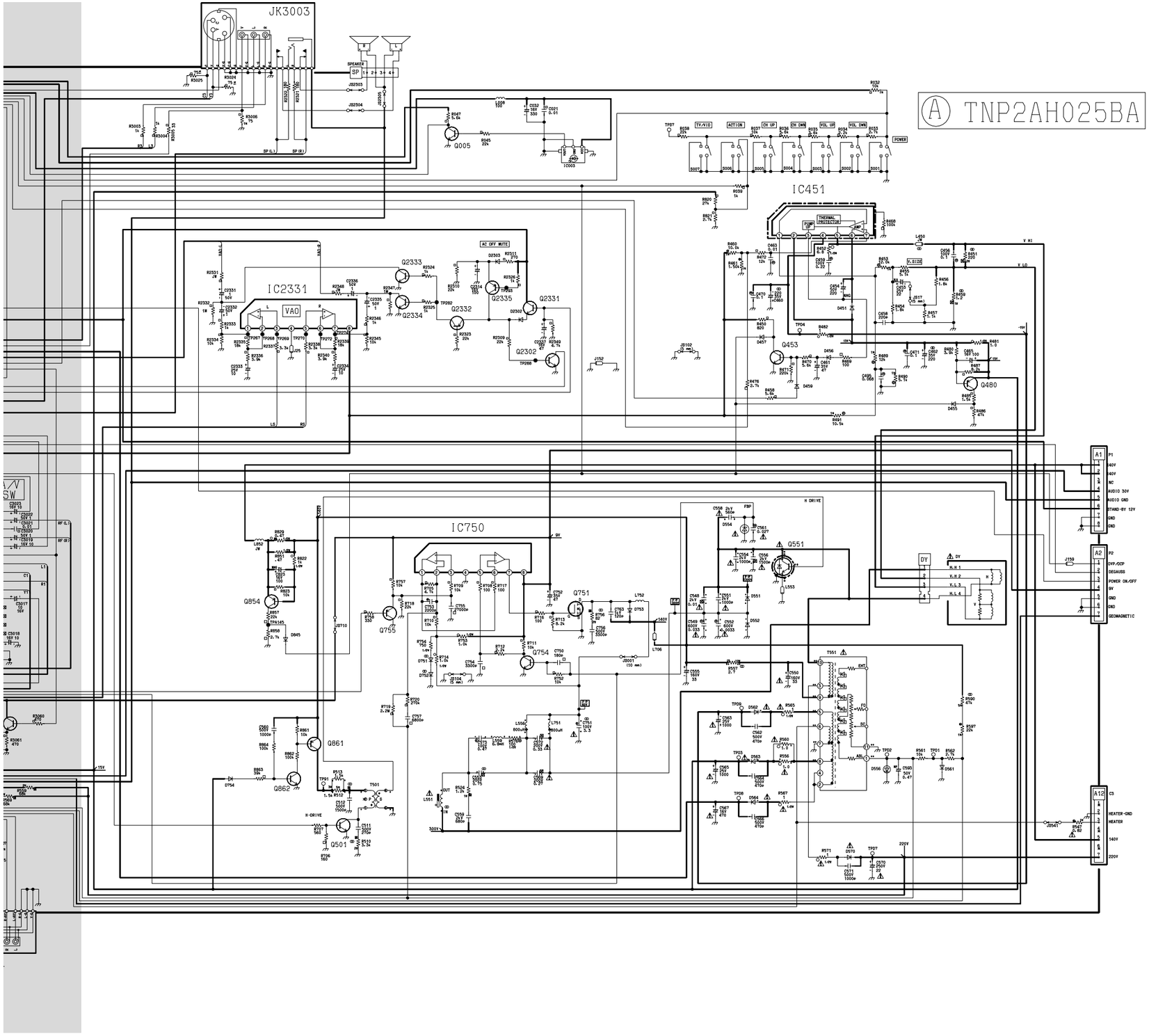
Voltage Measurements

1. Voltage measurement:
   - AC input to the Receiver is 120V. NTSC (HD, 1125i & 525P when applicable) signal generator is connected to the antenna of the Receiver. (Color bar pattern of 100 IRE white and 7.5 IRE black.)
   - All Picture and Audio adjustments are set to Normalize.
     TV ANT/CABLE - (Set-Up Menu) in TV/ANT Mode
     Volume - Min.
     TV/Video SW - TV position
     Audio Mode - Stereo
   - Voltage readings are nominal and may vary ±10% on active devices. Some voltage reading will vary with signal strength and picture content.
   - Supply voltages are nominal.
2. Ground symbol ⏚ indicates ground lead connection of meter. Incorrect ground connection will result in erroneous readings.

CAUTION: ***Incorrect ground connection of the test equipment will result in erroneous readings.***

A-Board Schematic, Left Portion - Diagrama Electrico de la Tarjeta-A, Sección Izquierda





IMPORTANT SAFETY NOTICE

THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES THAT ARE IMPORTANT FOR PROTECTION FROM X-RADIATION, FIRE AND ELECTRICAL SHOCK HAZARDS. WHEN SERVICING IT IS ESSENTIAL THAT ONLY MANUFACTURERS SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS DESIGNATED WITH A ⚠ IN THE SCHEMATIC.

Medición de Voltajes

1. Medición de voltaje:
   - El voltaje de entrada al Receptor es de 120V de Corriente Alterna. Un generador de patrones con formato NTSC se conecta a la entrada de la antena. (Patrón de Barras de Colores con 100 IREs para el Blanco y 7.5 IREs para el Negro.)
   - Los ajustes de los Menus Picture y Audio se normalizan.
     En el Menú Set-Up, en la opción ANTENA, se selecciona el modo de CABLE.
     El nivel de Volumen se minimiza.
     De los modos TV y Video, seleccionar el modo TV.
     Seleccionar modo Estereo del Audio.
   - Las mediciones de los voltajes son nominales y pueden variar hasta 10% en componentes en funcionamiento. Las lecturas de los voltajes pueden variar por la potencia de la señal y el contenido de la imagen.
   - Las fuentes de voltajes son nominales.
2. El símbolo ⏚ indica el tipo de tierra que se utiliza en la conexión del medidor.

PRECAUCION: Si no se utiliza la conexión a la tierra adecuada, se obtendrán mediciones equivocadas y podría dañar el equipo de medición.

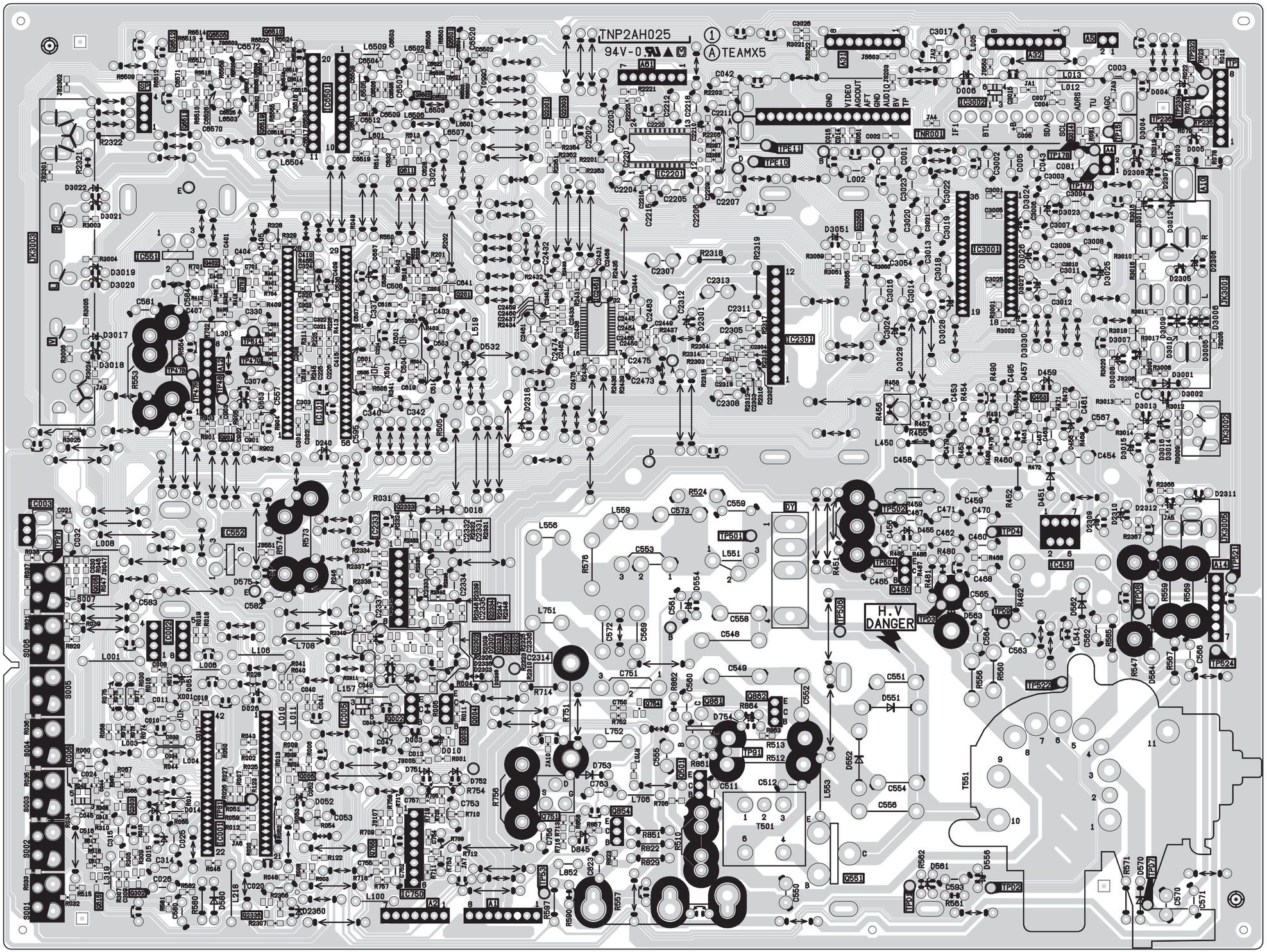
Voltage Measurements

1. Voltage measurement:
   - AC input to the Receiver is 120V. NTSC (HD, 1125i & 525P when applicable) signal generator is connected to the antenna of the Receiver. (Color bar pattern of 100 IRE white and 7.5 IRE black.)
   - All Picture and Audio adjustments are set to Normalize.
     TV ANT/CABLE - (Set-Up Menu) in TV/ANT Mode
     Volume - Min.
     TV/Video SW - TV position
     Audio Mode - Stereo
   - Voltage readings are nominal and may vary ±10% on active devices. Some voltage reading will vary with signal strength and picture content.
   - Supply voltages are nominal.
2. Ground symbol ⏚ indicates ground lead connection of meter. Incorrect ground connection will result in erroneous readings.

CAUTION: ***Incorrect ground connection of the test equipment will result in erroneous readings.***

NOTA DE SEGURIDAD

LOS DIAGRAMAS ELÉCTRICOS INCLUYEN CARACTERÍSTICAS ESPECIALES MUY IMPORTANTES PARA LA PROTECCIÓN CONTRA RAYOS-X, QUEMADURAS Y DESCARGAS ELÉCTRICAS. CUANDO SE DE SERVICIO ES IMPORTANTE USAR PARA REEMPLAZO DE COMPONENTES CRITICOS, SOLO PARTES ESPECIFICADAS POR EL FABRICANTES. LOS COMPONENTES CRITICOS ESTAN SEÑALADOS EN LOS DIAGRAMAS POR EL SIMBOLO ⚠.


TNP2AH025
94V-0
TEAMX5
H.V DANGER

IC001			
1	0.00	22	2.07
2	4.80	23	2.41
3	4.80	24	1.27
4	1.69	25	1.58
5	1.69	26	2.40
6	2.69	27	2.78
7	2.05	28	0.00
8	3.26	29	0.00
9	1.45	30	0.00
10	1.64	31	0.00
11	0.00	32	0.00
12	3.26	33	0.00
13	1.64	34	3.29
14	0.45	35	2.66
15	3.23	36	2.67
16	0.00	37	3.30
17	0.00	38	3.30
18	3.14	39	3.28
19	0.61	40	1.65
20	3.28	41	1.54
21	1.50	42	0.00

IC101			
1	4.00	29	3.33
2	0.00	30	3.34
3	3.28	31	0.00
4	3.28	32	0.00
5	3.28	33	3.83
6	0.00	34	1.11
7	6.01	35	1.81
8	5.16	36	0.00
9	5.19	37	8.95
10	0.00	38	3.12
11	5.57	39	6.15
12	4.48	40	7.49
13	2.64	41	5.88
14	2.67	42	4.88
15	2.67	43	1.12
16	8.54	44	0.00
17	5.10	45	1.74
18	5.03	46	1.58
19	5.01	47	2.23
20	2.54	48	2.24
21	3.96	49	3.86
22	4.50	50	3.35
23	0.65	51	4.89
24	0.64	52	2.94
25	5.22	53	2.98
26	2.06	54	3.75
27	4.33	55	2.91
28	4.92	56	3.20

IC3001			
1	8.71	19	0.00
2	3.60	20	0.00
3	4.48	21	3.98
4	4.48	22	3.21
5	4.48	23	3.80
6	3.67	24	3.83
7	3.91	25	3.81
8	4.48	26	3.26
9	4.49	27	3.21
10	4.48	28	3.81
11	3.70	29	3.83
12	3.94	30	3.81
13	4.48	31	3.71
14	4.48	32	4.23
15	4.48	33	4.48
16	4.31	34	4.49
17	4.80	35	4.48
18	4.79	36	4.58

IC002	
1	0.00
2	0.00
3	0.00
4	0.00
5	3.40
6	3.40
7	0.00
8	4.98

IC003	
1	2.75
2	0.00
3	4.98

IC006	
1	0.00
2	0.00
3	0.00
4	3.29
5	3.29

IC005	
1	4.98
2	0.00
3	1.48
4	3.29
5	0.00
6	4.98

IC2331	
1	4.37
2	4.37
3	4.37
4	0.00
5	4.37
6	4.37
7	4.37
8	4.77

IC2201	
1	0.00
2	0.00
3	0.00
4	2.22
5	2.20
6	0.30
7	4.86
8	2.40
9	2.35
10	0.47
11	2.20
12	2.97

IC2301	
1	0.00
2	0.00
3	30.69
4	0.00
5	0.00
6	0.00
7	15.54
8	0.64
9	0.00
10	31.98
11	12.03
12	15.33

IC3002	
1	3.23
2	3.60
3	8.70
4	3.30
5	0.00
6	3.29

IC551	
1	15.84
2	0.00
3	8.79

IC750	
1	8.75
2	6.49
3	3.01
4	4.61
5	0.00
6	5.05
7	5.04
8	3.00

IC451	
1	1.33
2	15.65
3	-13.03
4	-15.69
5	0.21
6	16.22
7	1.33

IC552	
1	8.04
2	0.00
3	4.90

	Q002	Q003	Q004	Q005	Q006
B	5.66	0.00	9.27	0.62	0.00
C	8.22	9.28	14.03	0.00	2.51
E	4.99	0.00	9.02	0.00	0.00

	Q014	Q201	Q2301	Q2302	Q2303
B	0.74	1.69	0.67	0.00	0.00
C	0.12	4.88	0.00	0.32	12.05
E	0.00	1.04	0.00	0.00	0.00

	Q2331	Q2332	Q2333	Q2334	Q2335
B	0.00	0.00	-0.49	0.00	14.02
C	14.23	-0.57	0.00	0.00	0.00
E	0.49	0.00	0.00	0.00	13.29

	Q2336	Q302	Q303	Q3050	Q402
B	0.61	3.55	3.66	3.70	0.63
C	0.00	4.91	4.91	8.69	3.66
E	0.00	2.92	3.03	2.98	0.00

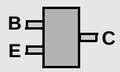
	Q453	Q480	Q501	Q515	Q551
B	0.72	15.72	0.28	0.00	0.00
C	0.00	0.00	107.5	2.78	12.68
E	0.00	15.93	0.00	0.00	0.00

	Q603	Q611	Q6501	Q6502	Q6506
B	1.02	0.00	2.84	1.11	0.00
C	4.88	0.00	4.87	0.00	1.69
E	1.02	0.69	2.18	1.78	0.00

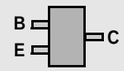
	Q6510	Q6511	Q6512	Q6519	Q701
B	2.33	2.24	1.69	2.43	0.63
C	4.87	4.87	4.87	2.25	4.50
E	1.70	1.58	1.04	1.78	0.00

	Q751	Q754	Q755	Q854	Q901
B	0.00	0.00	4.50	141.69	3.36
C	28.68	4.58	0.00	12.4	2.98
E	6.39	0.00	0.00	142.3	2.69

IDENTIFICACIÓN DE TERMINALES PARA TRANSISTORES EN *CHIP*



CHIP TRANSISTOR LEAD DESIGNATION



Nota:

La medición de los voltajes se hizo con un Voltímetro Digital.

Note:

Obtained voltages with a digital multimeter.

Medición de Formas de Onda

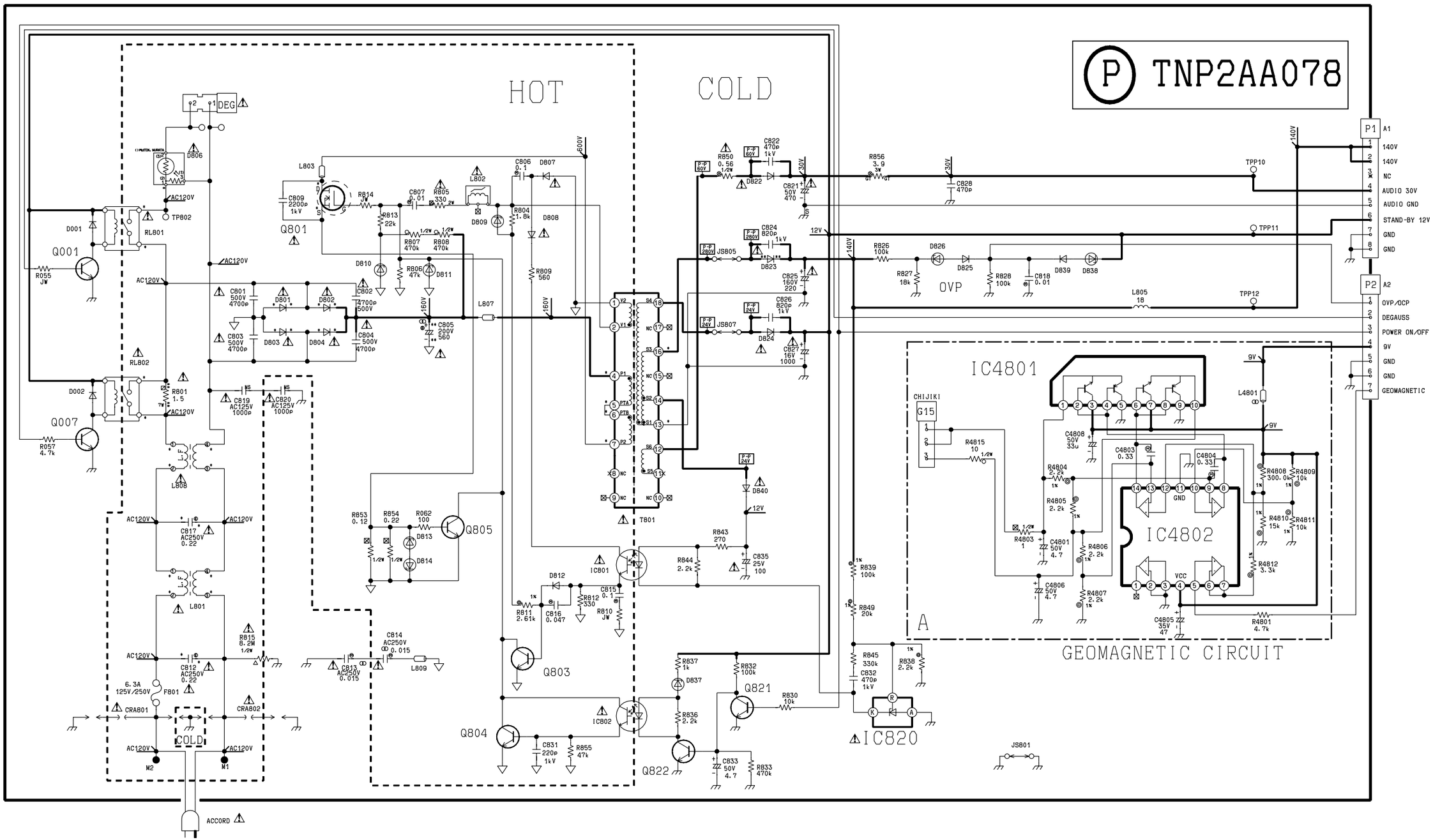
1. Un símbolo como (3) indica el punto para medir una señal. (La medición puede hacerse en el punto con mayor accesibilidad, siempre que sea común al indicado.)
2. Se midieron utilizando un generador con formato NTSC conectado a la terminal de la antena. (Patrón de 8 Barras de Colores EAI, formato NTSC de 100 IREs para el Blanco y 7.5 IREs para el Negro.)
3. Los ajustes de usuario de los Menus PICTURE y AUDIO se normalizaron. Posteriormente el nivel de volumen se ajusta al mínimo.
4. Las formas de onda de Video y Color fueron tomadas con un osciloscopio de banda alta y con un punta de prueba de baja capacitancia (10 a 1). La forma y amplitud de las ondas puede variar según el tipo de osciloscopio que se utilice y sus características.
5. El símbolo de tierra ⏚ que aparece junto al número de la forma de onda, indica que se utiliza conexión a **Tierra Caliente** en el extremo negativo de la punta de prueba.

PRECAUCION: Si no se utiliza la conexión a la tierra adecuada, se obtendrán mediciones equivocadas y podría dañar el equipo de medición.

Medición de Voltajes

1. Medición de voltaje:
   - El voltaje de entrada al Receptor es de 120V de Corriente Alterna. Un generador de patrones con formato NTSC se conecta a la entrada de la antena. (Patrón de Barras de Colores con 100 IREs para el Blanco y 7.5 IREs para el Negro.)
   - Los ajustes de los Menus Picture y Audio se normalizan.
     En el Menú Set-Up, en la opción ANTENA, se selecciona el modo de CABLE.
     El nivel de Volumen se minimiza.
     De los modos TV y Video, seleccionar el modo TV.
     Seleccionar modo Estereo del Audio.
   - Las mediciones de los voltajes son nominales y pueden variar hasta 10% en componentes en funcionamiento. Las lecturas de los voltajes pueden variar por la potencia de la señal y el contenido de la imagen.
   - Las fuentes de voltajes son nominales.
2. El símbolo ⏚ indica el tipo de tierra que se utiliza en la conexión del medidor.

PRECAUCION: Si no se utiliza la conexión a la tierra adecuada, se obtendrán mediciones equivocadas y podría dañar el equipo de medición.


P TNP2AA078
HOT
COLD
DEG
AC120V
TP802
RL801
Q001
R055 JW
D001
D002
RL802
Q007
R057 4.7k
R801 1.5
L808
L801
C817 AC250V 0.22
C812 AC250V 0.22
R815 8.2M 1/2W
6.3A 125V/250V
F801
CRA801
CRA802
M2
M1
ACCORD
C801 500V 4700p
C803 500V 4700p
C802 4700p 500V
C804 500V 4700p
D801
D802
D803
D804
C819 AC125V 1000p
C820 AC125V 1000p
L803
C809 2200p 1kV
Q801
R814 JW
R813 22k
C807 0.01
R805 330 2W
L802
D809
C806 0.1
D807
R804 1.8k
D808
R807 470k
R808 470k
D810
R806 47k
D811
R809 560
C805 200V 560
L807
600V
160V
C814 AC250V 0.015
C813 AC250V 0.015
L809
R853 0.12
R854 0.22
R062 100
Q805
D813
D814
T801
R850 0.56 1/2W
D822
C822 470p 1kV
C821 50V 470
30V
R856 3.9 3W
C828 470p
TPP10
140V
12V
TPP11
TPP12
JS805
C824 820p 1kV
D823
C825 160V 220
JS807
C826 820p 1kV
D824
C827 16V 1000
R826 100k
D826
D825
R827 18k
R828 100k
C818 0.01
D839
D838
OVP
L805 18
D840
R843 270
R844 2.2k
C835 25V 100
IC801
D812
R812 330
C815 0.1
R811 2.61k
C816 0.047
R810 JW
Q803
Q804
C831 220p 1kV
R855 47k
IC802
R837 1k
D837
R836 2.2k
Q822
C833 50V 4.7
R833 470k
R832 100k
Q821
R830 10k
R839 100k
R849 20k
R845 330k
C832 470p 1kV
R838 2.2k
IC820
P1
A1
140V
140V
NC
AUDIO 30V
AUDIO GND
STAND-BY 12V
GND
GND
P2
A2
OVP/OCP
DEGAUSS
POWER ON/OFF
9V
GND
GND
GEOMAGNETIC
IC4801
CHIJIKI
G15
R4815 10 1/2W
L4801
9V
C4808 50V 33u
C4803 0.33
C4804 0.33
R4804 2.2k
R4805 2.2k
R4803 1
C4801 50V 4.7
R4806 2.2k
R4807 2.2k
C4806 50V 4.7
IC4802
GND
VCC
R4808 300.0k
R4809 10k
R4810 15k
R4811 10k
R4812 3.3k
C4805 35V 47
R4801 4.7k
A
GEOMAGNETIC CIRCUIT
JS801

IC4801	
1	1.29
2	0.65
3	8.75
4	0.65
5	0.00
6	5.56
7	8.75
8	5.56
9	0.00
10	4.94

IC802	
1	11.37
2	0.00
3	0.00
4	11.37

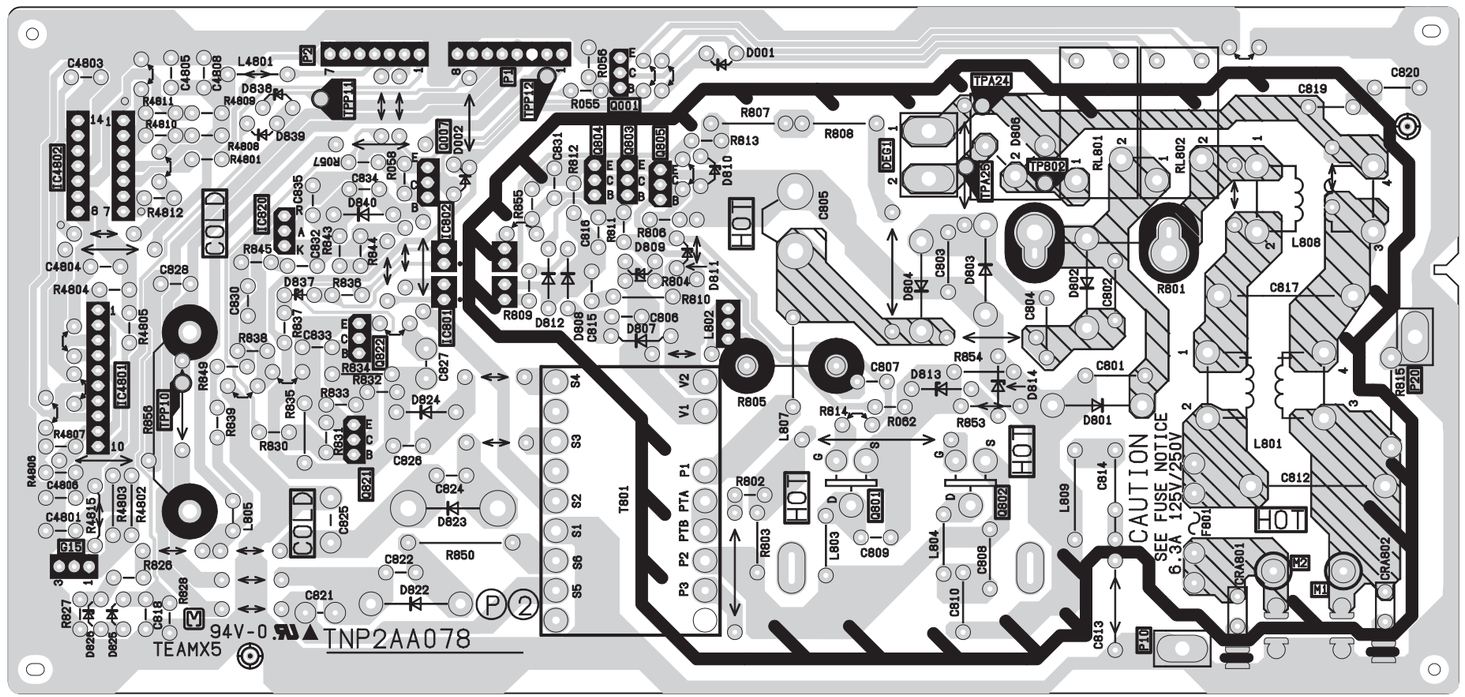
IC801	
1	15.34
2	0.00
3	0.00
4	14.31

IC4802	
1	0.00
2	0.00
3	0.00
4	8.76
5	3.04
6	3.03
7	3.03
8	0.65
9	3.72
10	3.67
11	0.00
12	3.69
13	3.69
14	5.56

IC820	
1	14.29
2	0.00
3	2.38

	Q001	Q007	Q801	Q803	Q804
B	0.12	0.63	0.00	0.00	0.00
C	-31.25	5.41	-32.41	4.39	4.47
E	4.48	0.00	4.51	0.00	0.00

	Q805	Q821	Q822
B	0.00	0.51	0.00
C	4.49	0.00	11.36
E	0.00	0.00	0.00



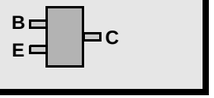
Nota:

La medición de los voltajes se hizo con un Voltímetro Digital.

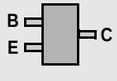
Note:

Obtained voltages with a digital multimeter.

IDENTIFICACIÓN DE TERMINALES PARA TRANSISTORES EN *CHIP*



CHIP TRANSISTOR LEAD DESIGNATION



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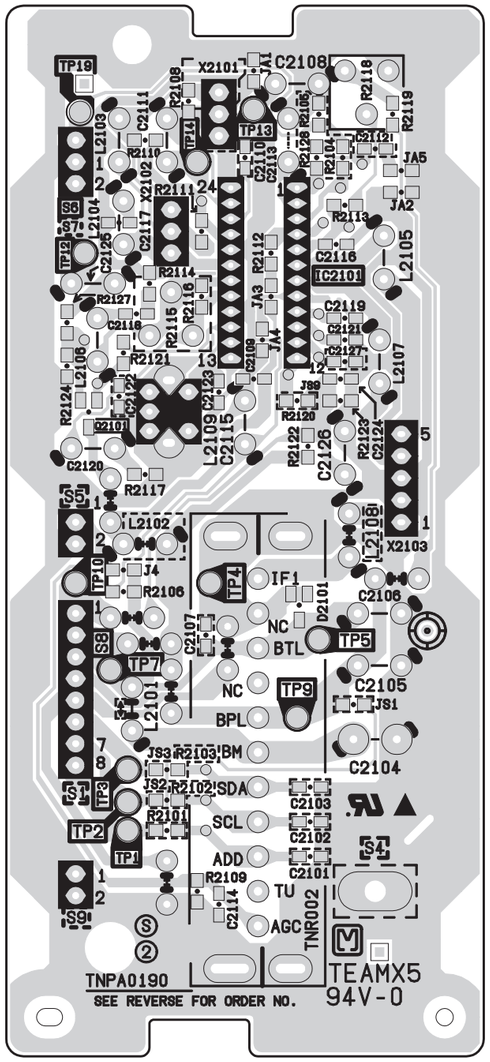
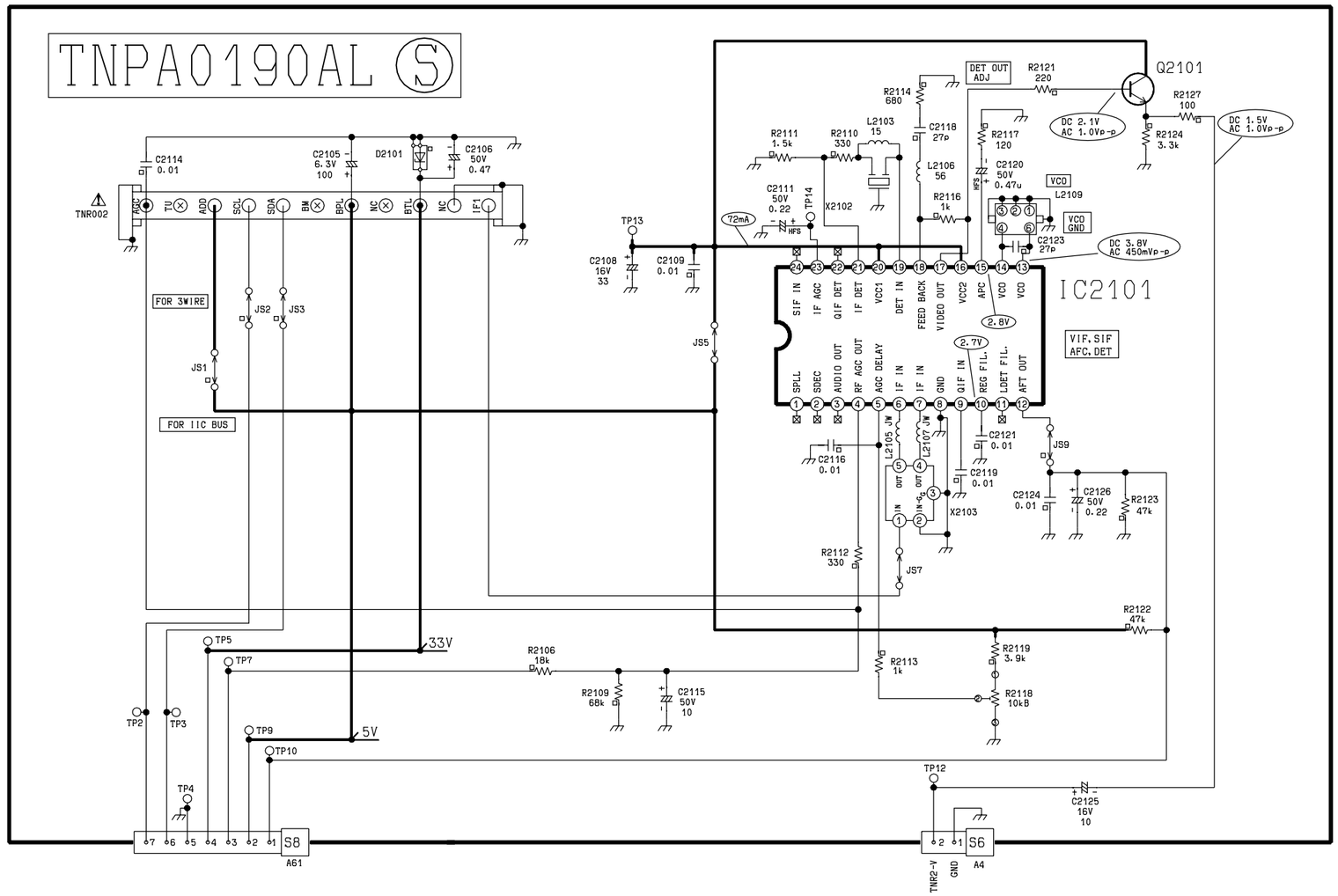
NOTA DE SEGURIDAD

LOS DIAGRAMAS ELÉCTRICOS INCLUYEN CARACTERÍSTICAS ESPECIALES MUY IMPORTANTES PARA LA PROTECCIÓN CONTRA RAYOS-X, QUEMADURAS Y DESCARGAS ELÉCTRICAS. CUANDO SE DE SERVICIO ES IMPORTANTE USAR PARA REEMPLAZO DE COMPONENTES CRITICOS, SOLO PARTES ESPECIFICADAS POR EL FABRICANTES. LOS COMPONENTES CRITICOS ESTAN SEÑALADOS EN LOS DIAGRAMAS POR EL SIMBOLO ⚠.

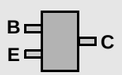




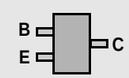
IC2101			
1	2.16	13	3.52
2	2.15	14	3.53
3	2.40	15	2.75
4	3.84	16	4.86
5	2.45	17	2.09
6	2.59	18	2.12
7	2.59	19	2.03
8	0.00	20	4.84
9	2.58	21	1.98
10	1.21	22	2.15
11	2.64	23	3.40
12	2.98	24	2.08

	Q2101
B	2.09
C	4.86
E	1.56

IDENTIFICACIÓN DE TERMINALES PARA TRANSISTORES EN *CHIP*



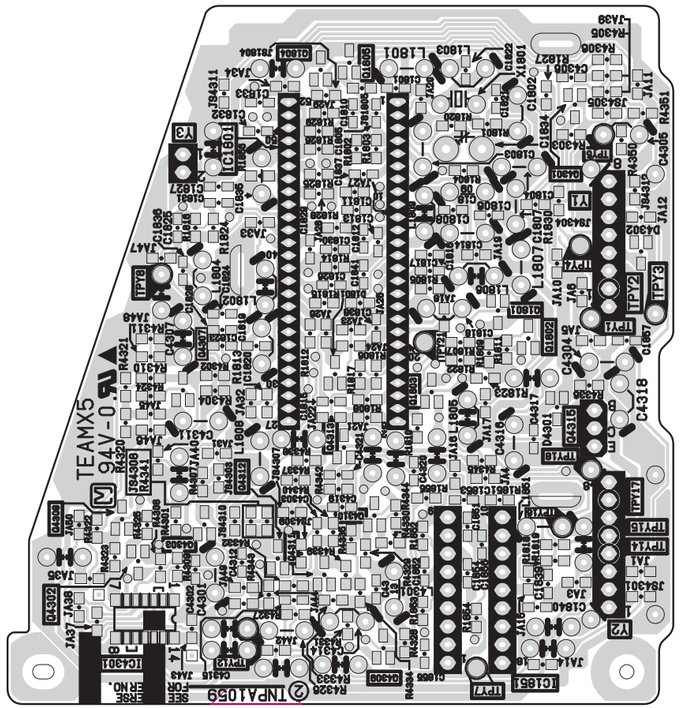
CHIP TRANSISTOR LEAD DESIGNATION

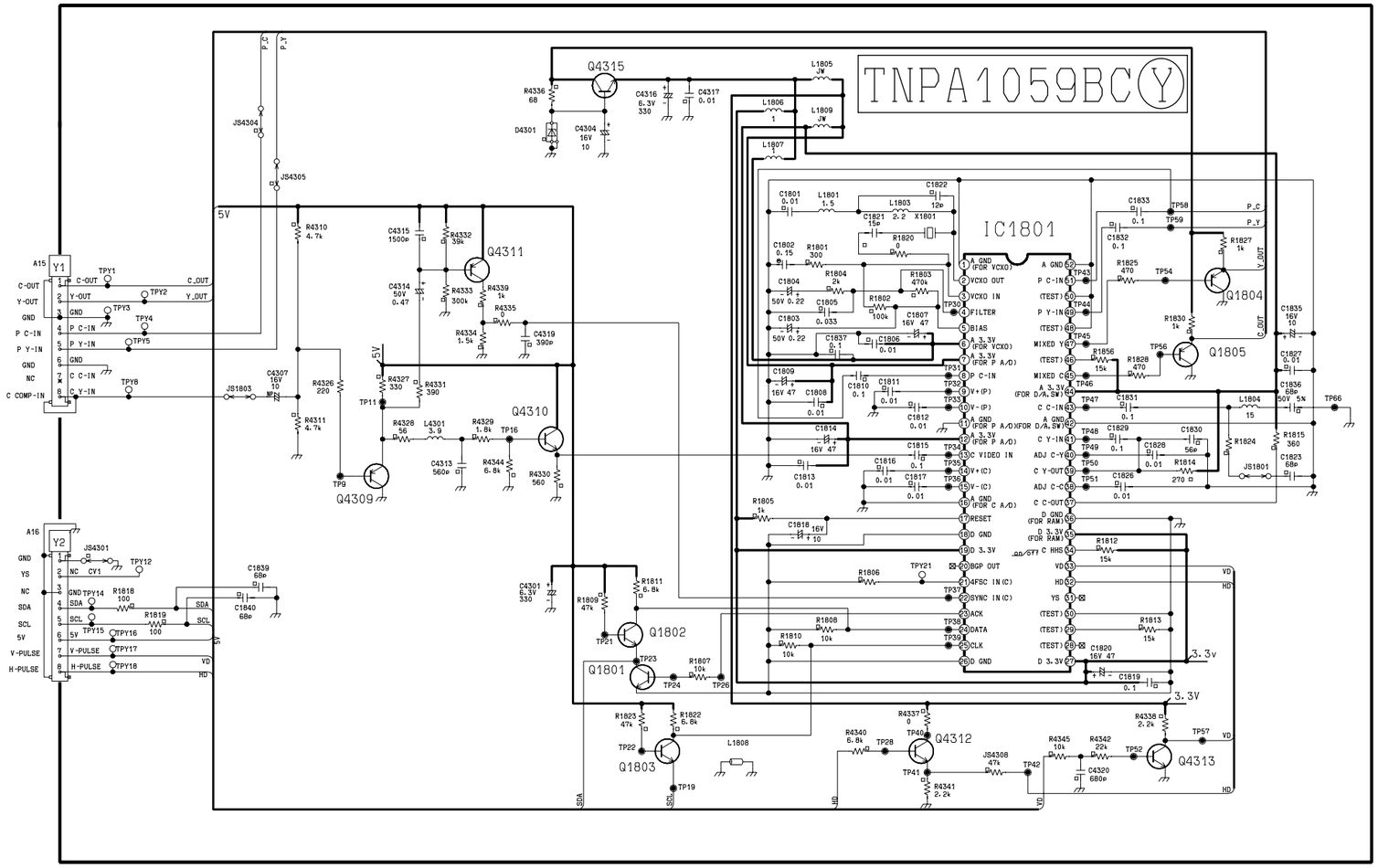


Voltage Measurements

1. Voltage measurement:
   - AC input to the Receiver is 120V. NTSC (HD, 1125i & 525P when applicable) signal generator is connected to the antenna of the Receiver. (Color bar pattern of 100 IRE white and 7.5 IRE black.)
   - All Picture and Audio adjustments are set to Normalize.
     TV ANT/CABLE - (Set-Up Menu) in TV/ANT Mode
     Volume - Min.
     TV/Video SW - TV position
     Audio Mode - Stereo
   - Voltage readings are nominal and may vary ±10% on active devices. Some voltage reading will vary with signal strength and picture content.
   - Supply voltages are nominal.
2. Ground symbol ⏚ indicates ground lead connection of meter. Incorrect ground connection will result in erroneous readings.

CAUTION: ***Incorrect ground connection of the test equipment will result in erroneous readings.***





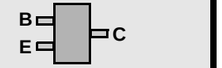
IC1801			
1	0.00	27	3.24
2	1.39	28	3.24
3	1.59	29	0.00
4	1.52	30	0.00
5	1.60	31	0.00
6	3.25	32	0.60
7	3.25	33	0.14
8	0.98	34	3.21
9	1.49	35	3.24
10	1.49	36	0.00
11	0.00	37	2.84
12	3.24	38	1.20
13	0.98	39	2.83
14	1.49	40	1.33
15	0.46	41	1.03
16	0.00	42	0.00
17	3.24	43	1.00
18	0.00	44	3.25
19	3.24	45	0.99
20	0.00	46	3.22
21	0.00	47	1.01
22	0.20	48	0.00
23	0.00	49	1.01
24	2.44	50	0.00
25	2.46	51	0.99
26	0.00	52	0.00

	Q1801	Q1802	Q1803	Q1804	Q1805
B	0.00	3.00	3.10	1.01	1.00
C	3.40	2.30	2.50	0.00	0.00
E	0.00	3.47	3.48	1.09	1.67

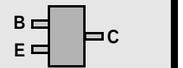
	Q4309	Q4310	Q4311	Q4312	Q4313
B	2.43	2.44	4.58	0.25	0.64
C	0.00	4.78	0.32	3.25	0.14
E	3.13	1.78	4.72	0.56	0.00

	Q4315
B	0.00
C	3.95
E	0.00

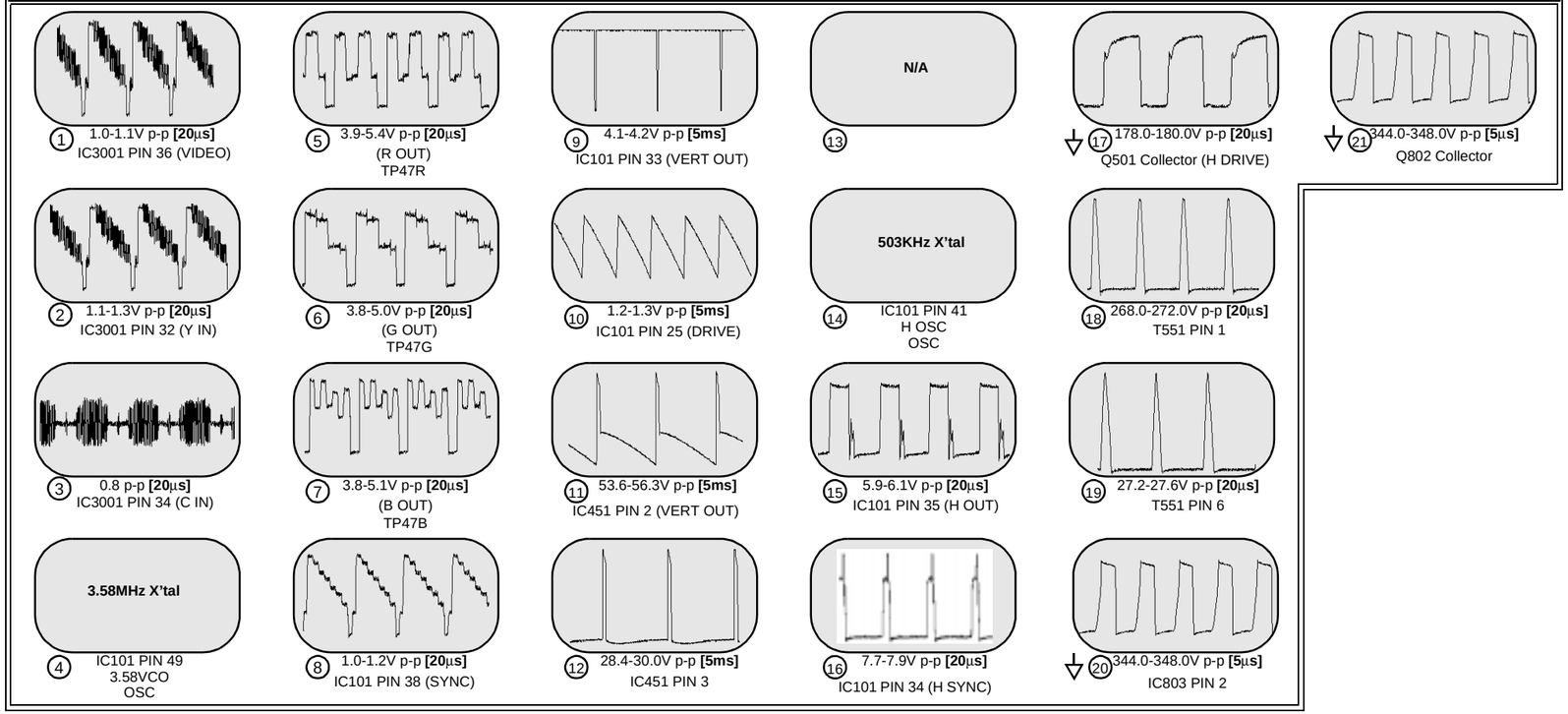
IDENTIFICACIÓN DE TERMINALES PARA TRANSISTORES EN *CHIP*



CHIP TRANSISTOR LEAD DESIGNATION



Waveforms - A-Board


1 1.0-1.1V p-p [20µs] IC3001 PIN 36 (VIDEO)
5 3.9-5.4V p-p [20µs] (R OUT) TP47R
9 4.1-4.2V p-p [5ms] IC101 PIN 33 (VERT OUT)
13 N/A
17 178.0-180.0V p-p [20µs] Q501 Collector (H DRIVE)
21 344.0-348.0V p-p [5µs] Q802 Collector
2 1.1-1.3V p-p [20µs] IC3001 PIN 32 (Y IN)
6 3.8-5.0V p-p [20µs] (G OUT) TP47G
10 1.2-1.3V p-p [5ms] IC101 PIN 25 (DRIVE)
14 503KHz X'tal IC101 PIN 41 H OSC OSC
18 268.0-272.0V p-p [20µs] T551 PIN 1
3 0.8 p-p [20µs] IC3001 PIN 34 (C IN)
7 3.8-5.1V p-p [20µs] (B OUT) TP47B
11 53.6-56.3V p-p [5ms] IC451 PIN 2 (VERT OUT)
15 5.9-6.1V p-p [20µs] IC101 PIN 35 (H OUT)
19 27.2-27.6V p-p [20µs] T551 PIN 6
4 3.58MHz X'tal IC101 PIN 49 3.58VCO OSC
8 1.0-1.2V p-p [20µs] IC101 PIN 38 (SYNC)
12 28.4-30.0V p-p [5ms] IC451 PIN 3
16 7.7-7.9V p-p [20µs] IC101 PIN 34 (H SYNC)
20 344.0-348.0V p-p [5µs] IC803 PIN 2

Waveform Measurements

1. (3) indicates waveform measurement. (Measurement can be taken at the best accessible location in common to the indicated point.)
2. Taken with an NTSC signal generator connected to the antenna terminal. (NTSC color bar pattern of 8 bars of EIA colors, 100 IRE white and 7.5 IRE black.)
3. Customer Controls (Picture/Audio Menu) are set to Normalize. Volume is set to "MIN".
4. All video and color waveforms are taken with a wideband scope and a probe with low capacitance (10 to 1). Shape and peak altitudes may vary depending on the type of Oscilloscope used and its settings.
5. Ground symbol ⏚ shown on waveform number indicates (Hot) ground lead connection of the Oscilloscope.

CAUTION: Incorrect ground connection of the test equipment will result in erroneous readings.

Medición de Formas de Onda

1. Un símbolo como (3) indica el punto para medir una señal. (La medición puede hacerse en el punto con mayor accesibilidad, siempre que sea común al indicado.)
2. Se midieron utilizando un generador con formato NTSC conectado a la terminal de la antena. (Patrón de 8 Barras de Colores EAI, formato NTSC de 100 IREs para el Blanco y 7.5 IREs para el Negro.)
3. Los ajustes de usuario de los Menus PICTURE y AUDIO se normalizaron. Posteriormente el nivel de volumen se ajusta al mínimo.
4. Las formas de onda de Video y Color fueron tomadas con un osciloscopio de banda alta y con un punta de prueba de baja capacitancia (10 a 1). La forma y amplitud de las ondas puede variar según el tipo de osciloscopio que se utilice y sus características.
5. El símbolo de tierra ⏚ que aparece junto al número de la forma de onda, indica que se utiliza conexión a **Tierra Caliente** en el extremo negativo de la punta de prueba.

PRECAUCION: Si no se utiliza la conexión a la tierra adecuada, se obtendrán mediciones equivocadas y podría dañar el equipo de medición.

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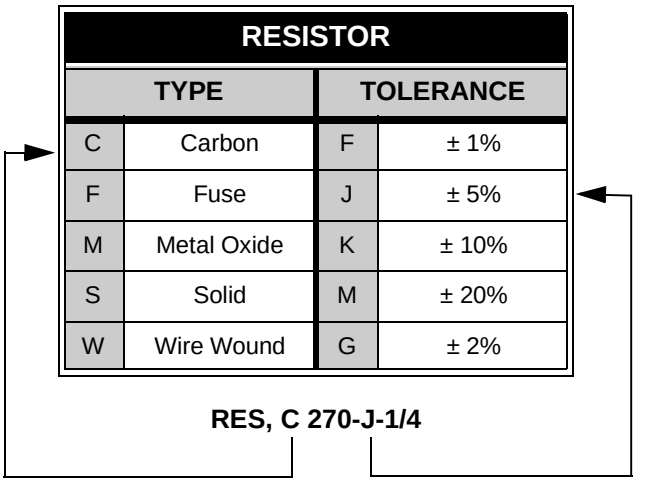
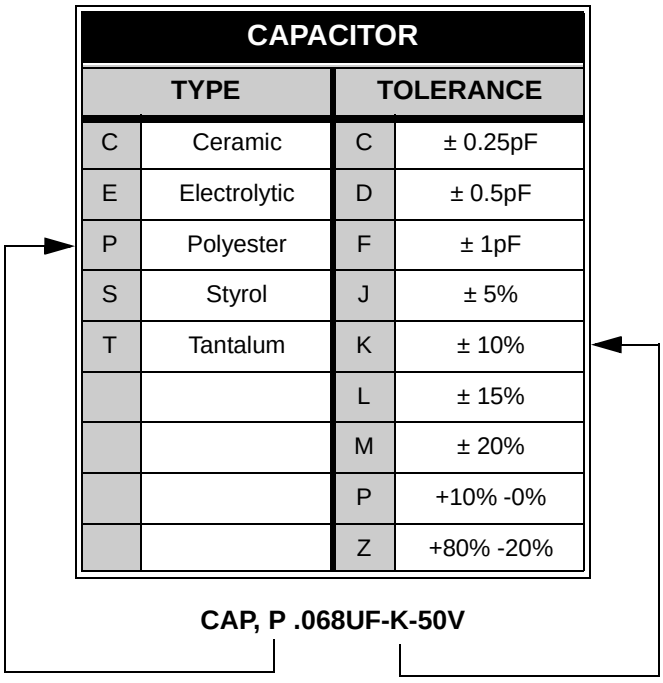
PARTS LIST ABBREVIATIONS GUIDE



RESISTOR			
TYPE		TOLERANCE	
C	Carbon	F	± 1%
F	Fuse	J	± 5%
M	Metal Oxide	K	± 10%
S	Solid	M	± 20%
W	Wire Wound	G	± 2%

RES, C 270-J-1/4



CAPACITOR			
TYPE		TOLERANCE	
C	Ceramic	C	± 0.25pF
E	Electrolytic	D	± 0.5pF
P	Polyester	F	± 1pF
S	Styrol	J	± 5%
T	Tantalum	K	± 10%
		L	± 15%
		M	± 20%
		P	+10% -0%
		Z	+80% -20%

CAP, P .068UF-K-50V

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